THE IRON TRADE REVIEW

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Eastern Furnaces Still Sounding Ore Market

Long Time Contracts for Ore—Pig Iron Production Increases—Some Irregularities in Finished Materials

Eastern steel companies continue to show a disposition to sound the market as to the possibility of obtaining part of their required ore tonnages from the Lake Superior district. The Bethlehem Steel Co. has sent out an inquiry aggregating about 200,000 tons, of which half is for manganiferous ores. No contracts have resulted from the eastern inquiries and it is not expected that any will be made in the near future. The activity of the week was confined to one Cleveland firm, which made long time contracts aggregating 300,000 tons of old range ore, and two sales, one for 35,000 tons of Bessemer and the other for 15,000 tons of non-Bessemer, for delivery during the coming season at such prices as may prevail when the price situation develops more definitely. Developments of the week, although by no means conclusive, have not been favorable for maintenance of last year's prices.

Pig Iron Output

The production of anthracite and coke pig iron for January amounted to 2,052,806 tons, an increase of 20,505 tons compared with December. The daily average output in January was 66,220 tons, compared with 65,558 tons in December. The increase was due entirely to the greater output of furnaces connected with steel plants, as the production of merchant iron shows a decrease of 3,993 tons.

Pig Iron

The pig iron market has been quiet throughout the country, but leading sellers report having done a very comfortable business during January. This is true of several large Cleveland agencies. An eastern steel company, which has been aggressive as a seller, disposed of 30,000 tons of various grades last month and an equal tonnage in December. It now develops that recent heavy purchasing by the largest cast iron pipe manufacturer amounted to fully 50,000 tons. In pig iron prices, if there is any change, it is toward hardening. An inquiry for 800 tons from a Mansfield concern, which had purchased what it thought would be its requirements for the second and third quarter of the year, illustrates the rapid increase in the manufacture of gasoline tractor engines in the place of steam engines. Southern iron seems to be pegged at $10 in spite of the fact that a number of companies are making higher quotations.

Some Soft Places

In finished materials, specifications against contracts made at low prices are heavy in most lines, particularly in wire products. On steel bars, plates and sheets there is some irregularity. The recent placing of a contract for 40,000 tons of structural material at 1.10c, Pittsburgh, shows what can be done on a large tonnage of desirable specifications.

Ship Contracts

Additional ship building contracts include the placing of a 10,000-ton steamer for the Panama canal service for W. R. Grace & Co., with the Cramps and a coal carrying steamer to be built for the Coastwise Transportation Co. by the New York Ship Building Co. The Carnegie Steel Co. will furnish 1,500 tons of plain material for a sea-going oil barge to be built for the Standard Oil Co. by the American Ship Building Co. at Cleveland, at which city the contract for 2,000 tons for a new Cleveland and Buffalo passenger steamer will soon be placed. The inquiry for steamships of Southern Pacific railroad interests, upon which bids have been entered by eastern builders, calls for four boats. Each vessel will require 10,000 tons of plates and 5,000 tons of shapes. Award on this work is expected soon.

Corporation Activities

The Steel Corporation's unfilled tonnage report for January, to be issued Saturday, will show a substantial increase over December despite the recent heavy rate of shipments. The leading interest continues to book new business fully equal to the rate that usually comes at the time of the active spring movement. Five additional Corporation furnaces are going in this week, including one at Newburg, one at Cleveland, Isabella No. 3, one at South Chicago and one at Joliet. The 35-inch blooming mill at Newburg, which has not been active for four years, has been ordered in. The Corporation's blast furnace operations are now at the rate of 86 per cent of capacity and finishing mills at about 85 per cent. Only five furnaces of all the Corporation subsidiaries in the Pittsburgh district are now idle.

WORLD'S IRON MARKETS

Pittsburgh

Heavy Specifying and Light Buying. —Some Soft Places.

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg., Feb. 6.

While production has continued on a most satisfactory basis during the past week and some good records in tonnage have been made by several of the leading interests, there has been little to bestir the trade insofar as new business is concerned, the apparent quiet of the whole field being maintained unbroken by any event of importance. The specifying against contracts for finished steel products has been exceptional, the records showing in some instances higher ratios of output than at any time in the history of some of the very large producers of this material. Of course, much of this is due to the lower prices at which the orders being worked off, were placed, and the belief that they will not reach that point again this year. There has been some show of weakness in plates, and prices are not quite so firm on shapes, but the changes are on small lots. The strength of the billet market is apparently being minimized owing to offerings from some of the larger independents to care for new business with spare capacity while the leading interest maintains its position of withdrawal from the market. The price of $28 for forging billets Pittsburgh, while still firmly maintained, appears to be largely local in significance.

More activity is noted in the pipe trade than in other lines and there is pending considerable new business that will have a strong bearing on merchant pipe, a large portion of which is likely to come out before the end of the present week. Wire products are extremely active in the matter of production and shipments, but little new business is uncovered as yet. The local pig iron market remains at its most quiet period in months, and is showing signs of weakening under the existing conditions, though sales are so small that the significance is not easy to trace. Connellsville coke operations are being maintained at above 400,000 tons weekly, varying slightly from local causes, such as severe weather and difficulty in securing sufficient labor to operate plants to capacity. In this case, however, much of the production is on existing contracts. New orders are rather slow to appear. Increasing furnace operations, however, are bringing into the market negotiations for new tonnage that is likely to influence the trade in the near future.

Pig Iron.—There has been practically no change in the local pig iron market during the past week, trading being confined to very small lots of both basic and foundry grades. Apparently the buyers are so well covered for the remainder of the first quarter that they are not interested in the situation and are not making inquiries to any extent. There is noted, however, a disposition to take promptly all shipments against contracts placed for the quarter and production and shipments for the month promise to maintain a good average compared with the first month of the year. More inquiries for the last half of the year are expected in the near future. So far the only one of importance is that of the Westinghouse Electric & Mfg. Co., which has not resulted in any contract being made. An inquiry for 2,000 tons of basic for delivery during the present quarter in Ohio, has not resulted in any action as yet. In face of the quiet situation generally, it is interesting to note that the leading interest has added another one to its active list of blast furnaces the past week, giving 50 out of 59 stacks to the active list. There was one stack in the valleys blown out for repairs, however, at the same time, though it is stated that it was only urgent necessity that caused this action to be taken at this time. Some reports of minor sales of basic at a shade off $12.40 valley are made where pig iron was wanted for prompt shipment. Bessemer iron remains quiet, but is firm and with few inquiries in the market. Gray forge is not active and buyers appear to be well covered for the remainder of this quarter. We quote the market as follows:

(Prompt Shipment.)

Bessemer, valley	$14.25
Bessemer, Pittsburgh	15.15
Basic, valley	12.40
Basic, Pittsburgh	13.30
No. 2 foundry, Pittsburgh	13.90
Gray forge, Pittsburgh	13.65
Malleable, Pittsburgh	13.90

(First Quarter.)

Bessemer, valley	$14.25
Bessemer, Pittsburgh	15.15
Basic, valley	12.40
Basic, Pittsburgh	13.30
No. 2 foundry, Pittsburgh	13.90
Gray forge, Pittsburgh	13.65
Malleable, Pittsburgh	13.90

Ferro-Alloys.—There has been very little change in the market for alloys and the inquiries have been smaller and prices stationary. Small lots of ferro-silicon, 50 per cent, are selling at $70. Lower grades still remain weak.

We quote ferro-manganese nominally at $41, Baltimore, for prompt and forward delivery. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted nominally at $70, Pittsburgh, for prompt and forward delivery; 12 per cent, $22; 11 per cent, $21; 10 per cent, $20, f. o. b. Globe, Jisco and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—The market for plates remains somewhat quiet, and comparatively little new business has been placed, though there is considerable figuring on desirable tonnage, and prices are unchanged. Mill orders are sufficient to maintain the January schedule thus far into February. Car orders are lacking though inquiries are out for Western Maryland requirements of 2,750 cars, and Bessemer & Lake Erie for 1,500, the latter not so large as at first reported. The Pennsylvania system has distributed its order for 180 steel passenger coaches during the week, 65 going to the Pressed Steel Car Co., 65 to the American Car & Foundry Co., and 50 to the Standard Steel Car Co. There are some other orders still pending. In small sales, there are said to be offerings of plates of 1.12½c to 1.15c, Pittsburgh. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.15c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates vary-

ing not more than 4 inches in width at ends, narrowest end being not less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ¼ inch to and including ⅛-inch plate on thin edge, 0.10c; under ⅛ and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—Specifications against contracts for sheets are coming to the manufacturers fully as freely for February as during the month of January. Trading for this month has improved but slightly. Mills seem to be fairly well provided with orders for February shipments. The leading interest at the present time reported the largest production and largest shipments in its history. There has been some effort on the part of buyers to increase their orders on the earlier prices, but they have been declined. The market holds firmly on the last advances. We quote the market as follows, $1 a ton added as delivered price in the district of Pittsburgh:

Blue annealed sheets No. 10 gage, 1.40c; black annealed sheets No. 28 gage, 1.90c; galvanized sheets, No. 28 gage, 2.90c; painted roofing sheets, $1.35 per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets, $2.45 per square for No. 28 gage, 2½-inch corrugation, f. o. b. Pittsburgh.

Tin Plate.—Specifications for tin plate continue slightly above normal for this season. Prices are being firmly held, although very little new business is coming out at this time. Most of the important consumers have covered for the first quarter and some for the first half of their year's requirements. Several of the larger independents are believed to be operating to capacity and the leading interests have also slightly increased their productions. A feature of the past week has been the coming out of the allotments of tonnage from Alaskan canners somewhat earlier this year than usual to avoid delays in transportation to the Alaskan field. We quote the market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.40 f. o. b. mill, Pittsburgh district.

Rails and Track Material.—Some moderate tonnages have been added to the rail makers' books during the past week, through the distribution of some contracts placed the previous week, and a slightly increased rate of production is being maintained. The week has lacked new business of importance to the Pittsburgh district insofar as standard section rails are concerned. Light rails are moving about the same with a fair tonnage booked in new business the past week, but prices are not changing. Railroad spike buying is quiet, but there appears to be considerable business pending.

The market is quoted as follows, the base price on open-hearth steel rails being 1.34c per pound at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.16c, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburgh; track bolts, 2.20c to 2.25c, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9-16	$1.40
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7/16	.20
3, 3½, 4 and 4½ x 3/8	.30
2½ x 3/8	.40
2½, 3 and 3½ x 7/16	.60
2 x 7/16	.80

Steel.—Continued heavy buying of billets and sheet bars, the withdrawal in the meantime by the leading interest of that market and the throwing over to the independents of a considerable volume of tonnage during the past week have caused deliveries to fall somewhat behind in Pittsburgh. Considerable inquiry for forging billets at $28 is coming to the larger producers of this territory, and this price is accepted as base for new business at Pittsburgh. Bessemer and open-hearth billets are firm at $20, Pittsburgh or Youngstown. Consumers are specifying heavily against contracts in the Pittsburgh district. Billets and sheet bars are quoted as follows:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $20, with the usual extras for size and analysis, and open-hearth rolling billets, $20, Bessemer sheet and tin bars are quoted at $21, and open-hearth sheet bars are quoted at $21 f. o. b. Pittsburgh or Youngstown, with full freight to destination added. Forging billets are quoted at $28, Pittsburgh.

Hoops and Bands.—There is very little change in the market for hoops. Production continues large, but new business is not important, as most of the buyers are well covered for immediate requirements. Prices on both hoops and bands are firm and unchanged. We quote the market as follows:

Hoops in carload lots, 1.25c to 1.30c, Pittsburgh; in less than carload lots, 1.40c; bands, 1.15c, base, with net extras, as per standard steel.

Merchant Bars. — Specifications against existing contracts for steel bars continue heavy and mills are in comfortable shape in this respect, though new business seems lacking for the time. Bar iron is moving somewhat slowly, and mills could care easily for additional business at this time. The market for shaftings is unchanged and contracts are being specified against with a fair degree of promptness.

We quote the market as follows:

Common iron bars, 1.35c, Pittsburgh; Bessemer and open-hearth steel bars, 1.15c; plow and cultivator, 1.25c; channels, angles, zees, tees, under 3 inch, 1.25c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35 advance. Cold rolled and ground shafting, 65 per cent off in carloads and 60 and 10 per cent in less than carloads, delivered in base territory.

Muck Bar.—There is very little demand for muck bar at this time, and inquiry is also lacking, sufficient to indicate any immediate change in the situation. We quote muck bar at $28 to $29, Pittsburgh.

Structural.—Demand for structural has been exceptionally quiet during the past week in the local market. Such contracts as have been placed have been small and unimportant. There is, however, considerable figuring going on for fair sized tonnages, including material for bridge work for a western railroad and for some extensions to local industrial plants, which have not been awarded as yet. Building steel is also being figured on for some local contracts, one including a new theater building for lower Penn avenue, Pittsburgh, for which plans have been prepared and estimates are now being made, but the steel requirements have not been announced. We quote the market as follows:

Beams and channels, 15 inches and under, zees, 1.15c to 1.20c; tees, 1.15c to 1.20c; angles, from 3 to 6 inches, 1.15c to 1.20c; over 6 inches, 1.25c; universal and sheared 1.15c to 1.20c; over 15 inches, 1.25c to 1.30c, plates, 6¼ inches wide and wider, 1.25c.

Merchant Pipe.—Two fair sized contracts for merchant pipe are expected to be awarded this week. The first is from a local interest, which calls for 7,000 tons of iron pipe to cover its year's requirements and which is expected to be distributed among a number of independent manufacturers. A second contract calls for 25 miles of 16-inch steel line pipe for Ohio delivery. There is said to be another large buyer in the market, who is about ready to award contracts for a good sized pipe line for construction this spring and approximating 40 miles. Specifications continue to be above normal and shipments of merchant pipe from the mill are ahead of the record of a year ago, by a wide margin. Official discounts are well sustained. We quote the following official discounts to jobbers, sub-

ject to the usual preferential discount to larger buyers:

Iron and Steel Pipe Basing Prices

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼ inch	74	54	68	48
⅜ inch	75	65	69	59
½ inch	78	68	72	62
¾ to 1¼ inch	81	73	75	67
2 to 3 inches	82	75	76	69
	Lap weld.			
2 inches	79	72	72	65
2½ to 4 inches	81	74	74	67
4½ to 6 inches	80	72	73	65
7 to 12 inches	77	68	71	61
13 to 15 inches	55	..	47	..
Extra Strong, Plain Ends.				
	Butt weld.			
⅜, ¼, ⅛ inch	70	60	65	55
½ inch	75	69	70	64
¾ to 1¼ inch	79	73	74	68
2 to 3 inches	80	74	75	69
Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	76	70	71	65
2½ to 4 inches	81	74	74	67
4½ to 6 inches	77	71	72	66
7 to 8 inches	70	60	65	55
9 to 12 inches	65	55	60	50
Double Extra Strong, Plain Ends.				
	Butt weld.			
½ inch	65	59	60	54
¾ to 1¼ inch	68	62	63	57
2 to 3 inches	70	64	65	59
Double Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	66	60	61	55
2½ to 4 inches	68	62	63	57
4½ to 6 inches	67	61	62	56
7 to 8 inches	60	50	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

The above discounts are for full weight pipe, subject to a variation of 5 per cent, merchant pipe, when specified, being furnished up to 6 inches at one point higher discount (lower price.)

Boiler Tubes.—There has been some slight improvement in the demand for boiler tubes and concessions are not so readily granted as to prices for new business as they were a week ago. The situation, however, is not satisfactory and manufacturers complain of dullness and of the uncertainty that exists. Locomotive boiler tubes are showing a stronger position and there is a better specifying against existing contracts than for some time. The official discounts on steel and charcoal iron boiler tubes follow:

Steel:

1¾ to 2¼ inch	65
2½ inch	67½
2¾ to 3¼ inch	72
3½ to 4½ inch	75
5 and 6 inch	67½
7 to 13 inch	65

Charcoal Iron:

1½ inch	48
1¾ to 2¼ inch	50
2½ inch	55
2¾ to 5 inch	60

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire Products. — Wire mills in Pittsburgh territory are running under high pressure to meet the continued heavy specifications against contracts for material placed prior to the last advance in prices in January. New buying has not thus far been important, though there is noted some slight improvement in this respect, which is probably due to the fact that orders taken at the new prices are restricted to less than 60 days at this time. The tendency is toward a better demand in the near future on new business. Cut nails are in fair demand and at firm prices. We quote the market as follows:

Wire nails, jobbers, carload lots, $1.60; retailers' carload lots, $1.65; cut nails (western makers), jobbers' carload lots, $1.55 to $1.60, painted barb wire, jobbers' carload lots, $1.60; retailers' carload lots, $1.65 with 30c for galvanizing; plain wire to jobbers in carloads, $1.40; and to dealers, in carloads, $1.45; polished staples, $1.60; galvanized staples, $1.90.

Wire Rods.—Activity in the wire rod market continues apace with the general condition of wire products. Consumers of wire rods are specifying heavily on old contracts at present and taking liberally on their orders. There is, however, no special taxing of the mill capacity at this time and new business is not important. We quote $25 to $25.50, Pittsburgh, for Bessemer and open-hearth rods.

Coke. — Heavy shipments of coke the past week have encouraged a very active production during the same period, which will likely show a slight increase in tonnage for the entire field. Cold weather has interfered somewhat with operations and a shortage of labor was felt at the same time, but since Monday this has been relieved by the return of a large number of coke workers from the Old Country. Some fair sales of foundry coke for prompt shipment have been made, varying from 2,000 to 4,000 tons. A furnace outside of Pittsburgh district has come into the market for Connellsville coke and three others are expecting to go into blast soon, which will likely increase consumption sufficiently to absorb the gain in oven productions. We quote standard Connellsville furnace coke for prompt shipment at $1.90 to $2, ovens. On high grade Connellsville foundry coke, we quote $2.25 to $2.40, ovens, for prompt shipment, and $2.25 to $2.40, ovens, on contract. The Connellsville *Courier's* figures for the week ending Jan. 27 show 38,995 active ovens with a production of 400,597 tons, as compared with 39,063 ovens with a production of 407,185 tons for the previous week.

Old Material.—The scrap market in Pittsburgh continues lifeless and further weakening of prices is noted, which affects the local situation and tends to further check any considerable buying. We note a reduction in some small sales of heavy melting scrap of 25 cents a ton, though nominally the market remains at $12.75. The effect has been to increase the spread in this line. Machine shop turnings are selling at a decline of 25 cents a ton to $9.25 to $9.75. Cast borings are quoted $9 to $9.25, also a decline of 25 cents, and No. 1 cast scrap is down to $12.50 to $12.75. Some of the larger buyers of scrap are requesting further deferring of shipments in order to reduce stocks on hand. We quote gross tons, delivered in the Pittsburgh district, including Monessen, Steubenville, Brackenridge and Follansbee, as follows:

Heavy melting scrap	$12.25 to 12.75
Rerolling rails	12.75 to 13.00
Malleable	12.00 to 12.50
Bundled, sheet scrap	11.00 to 11.50
Iron axles	21.50 to 22.00
Old iron rails	15.00 to 15.50
Stove plate	9.00 to 9.50
No. 1 wrought scrap	13.00 to 13.50
Old car wheels	13.00 to 13.50
Low phosphorus	15.00 to 15.50
Machine shop turnings	9.25 to 9.75
Cast borings	9.00 to 9.25
No. 1 cast scrap	12.50 to 12.75

Chicago

Some Weakness in Plates and Shapes. —Pig Iron Quiet.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Feb. 6.

The steel mills in the west are very well satisfied with the situation as far as tonnage is concerned, but in some quarters there is disappointment over the failure of the market to advance and trepidation on account of the slowing up in new business. Practically every mill in this territory, however, has as much tonnage on its books now as was the case Jan. 1. That is, new orders during January were practically equal to shipments, although there was a falling off in current business compared with December. Some weakness is noted in quotations on plates and structurals and it is possible that attractive business will bring out prices lower than 1.30c, Chicago. Car business is comparatively light and the structural market is characterized by a multitude of small orders, which makes a fairly satisfactory aggregate tonnage. The largest structural contract reported in the west last week was for the Monward Bank building, St. Louis, 4,768 tons, which was let to James Stewart & Co. The American Bridge Co. also took 1,060 tons for another building in St. Louis. The Great Northern has placed an additional order covering 24,000 tons of rails and the Soo Line has increased its rail order to 22,000 tons; the Wa-

bash has issued an informal inquiry for 15,000 tons. The Gary rail mill is still idle, but will probably start up this month.

Pig Iron.—Business is quiet and no transactions of consequence were reported last week. The southern makers persist in their firm stand with regard to prices and the market on No. 2 foundry is now quotable at $10.50, Birmingham, for shipment into western territory, with the exception of the immediate Chicago district, where competition from local furnaces is keeping down the price. More properly speaking, it is keeping southern iron out of the market, since the producers are not willing at the present time to make material concessions. A few small orders for less than 100 tons each are noted in the city of Chicago for southern No. 2 at $14.85 delivered, but it is very doubtful if this price could be obtained on any extensive transactions. The Crane Co. purchased 500 tons of No. 3 southern iron at $14.10 delivered. It is well known that the lower grades are relatively scarcer in the south. The M. Rumely Co. is inquiring for 100 tons of Virginia iron. There is a fair inquiry for third quarter delivery, but furnace interests are not disposed to quote on this business. We note an order for 200 tons of southern No. 2, for shipment over the first half to a Beloit, Wis., foundry. Melters are taking out their full contract tonnage and in some cases are asking the furnaces to anticipate shipments.

The following prices represent the market for Chicago delivery except Northern No. 2 foundry and malleable Bessemer made in local furnaces, which are quoted f. o. b. furnace:

(First Half Shipment.)

Lake Superior charcoal	$16.50
Northern foundry No. 2	14.00
Southern foundry No. 2	14.85
Southern silveries, 5 per cent silicon	15.60
Jackson Co. silveries, 8 per cent	17.40
Malleable Bessemer	14.00
Alabama basic	14.85

Billets.—The local billet market is devoid of features and prices show no change. Manufacturers report that orders are good and are slowly improving. We quote, open-hearth forging billets, $26, Chicago; re-rolling billets, $22.60.

Merchant Bars.—The mills in this territory are well satisfied with the steel situation as far as tonnage is concerned, but in some quarters there is disappointment over the lack of buoyancy in prices. Most mills have as much tonnage on their books now as they had Jan. 1. That is, new orders during January were practically equal to shipments, although there was a falling off in new business compared with December. The bar iron mills have not changed their rate of operations recently and bar iron prices are steady at 1.15c to 1.20c, Chicago.

We quote, for Chicago delivery, as follows:

Bar iron, 1.15c to 1.20c; hard steel bars, rerolled, 1.15c to 1.20c; soft steel bars, bands and small shapes, 1.25c to 1.33c, base; hoops, 1.48c; smooth finished machinery steel, 1 inch and larger, 1.78c; shafting 60 per cent off list for carload lots, 55 per cent off for less than carloads.

On iron and steel from local stock, we quote as follows:

Bar iron, 1.50c to 1.60c per pound base; soft steel bars, 1.50c to 1.60c per pound base; soft steel hoops, 1.80c to 1.90c, full extras.

Structural Material.—The market on plain material, while not quotably lower, is somewhat weaker and there is evidence of concessions to fabricators. The fabricating situation at present is characterized by a multitude of small orders, which makes the aggregate tonnage fairly satisfactory. The total amount of plain material involved in contracts let in the west last week is 9,685 tons. The Monward Realty Co. bank building, St. Louis, 4,768 tons, has been let to James Stewart & Co., and the American Bridge Co. has taken 1,060 tons for another building in St. Louis, on which the general contract is held by the James Black Masonry & Contracting Co. The Missouri, Oklahoma & Gulf railway has divided 1,429 tons of bridge material between the Fort Pitt Bridge Co. and the Wisconsin Bridge Co. The Larkin Soap Co. will erect a reinforced warehouse in Chicago, which will require 370 tons of steel. The Pacific Rolling Mill Co., San Francisco, has taken 325 tons for a hotel at that city. A contract has also been placed for car barns for the Muskogee Electric Traction Co., at Muskogee, Okla., 169 tons. The Kansas Milling Co., Wichita, Kan., has placed local contracts for reinforced concrete grain tanks which will need 179 tons of steel. Other fabricating contracts reported let in the west are as follows: A steel building for the state reformatory, Monroe, Wash., 157 tons, to Hofius Steel & Equipment Co., Seattle; The Hygienic Ice Co. building, Sixty-fourth and State streets, Chicago, 241 tons, let to the Kenwood Bridge Co.; Charles E. Henderson office building, Duluth, Minn., 178 tons, let to the American Bridge Co.; two 55,000-barrel tanks, for the California Union Oil Co., San Francisco, 290 tons, let to the Petroleum Iron Works; addition to the Albany hotel, Denver, Colo., 285 tons, let to the Lowith Brothers Iron Works, and a residence for Charles Pillsbury, Minneapolis, Minn., 114 tons, let to the Minneapolis Steel & Machinery Co.

We quote, structural material, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.30c to 1.38c. For extras, see Pittsburgh report.

Plain material out of store is as follows:

All angles, 3 inches and larger, including 6 inches, $1.60 to $1.65 per 100 pounds; angles over 6 inches, $1.70 to $1.75 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.60 per 100 pounds, base; channels, 3 inches and larger, $1.60 per 100 pounds, base.

Rails and Track Fastenings.—The Great Northern has placed an additional order covering 24,000 tons of standard rails, divided, it is understood, between the Colorado Fuel & Iron Co., the Lackawanna Steel Co. and the Illinois Steel Co., the latter's share being 10,000 tons. The Soo Line has increased its rail order to a total of 22,000 tons. The first order from this system, placed some time ago, was for 15,000 tons. Specifications for track fastenings are of good volume and no price changes are noted.

We quote, light rails, f. o. b. Chicago, and track fastenings, f. o. b. Joliet, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $23.50 to $24.

Track fastenings, f. o. b. Joliet, angle bars, 1.50c; railroad spikes, 1.50c to 1.55c, smaller size spikes, 1.65c, base; track bolts with square nuts, 1.90c base.

Plates.—There is no change in the situation in the west, and new business makes up only a small portion of the current tonnage coming to the mills. Partly on account of eastern competition, plate prices are not quite as firm as they were recently. Car business is comparatively light. The Northern Pacific is in the market for 50 tank cars. Swift & Co. has ordered 500 steel underframes from the Whipple Car Co. The Rock Island lines are inquiring for 20 combination baggage and passenger cars, 10 combination baggage and express cars and 10 mail cars. The Chicago & Northwestern is understood to have ordered 550 all-steel hopper cars from the Western Steel Car & Foundry Co.

We quote, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6¼ to 100

inches wide, 1.30c to 1.38c. For extras, see Pittsburgh report.

Store prices are as follows:

Tank steel. ¼ inch and heavier, up to 72 inches wide, 1.60c.

Sheets.—The situation in the west has been relieved by the withdrawal of certain Ohio mills from this market and the local mills are now absorbing practically all of the business in this territory. While the sheet tonnage is quite satisfactory to the leading makers, there is no disposition to increase quotations. The demand for sheets out of stock is moderately good.

We quote, store prices, f. o. b. Chicago, as follows:

Blue annealed, No. 10, 1.90c; No. 12, 1.95c. Box annealed, No. 28, 2.30c. Galvanized, No. 28, 3.35c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—The early spring demand for fencing and barb wire from agricultural regions is up to expectations and specifications for plain wire are fair. The local mills are running practically at capacity. Very little new business, however, has been placed since the recent advance.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.78; retailers' carload lots, $1.88; retailers' less than carload lots, $1.98; painted barb wire, jobbers' carload lots, $1.78; retailers' carload lots, $1.88; retailers' less than carload lots, $1.98, with 30c for galvanizing; plain wire, jobbers' carload lots, $1.58; retailers' carload lots, $1.63.

Merchant Pipe and Tubes.—There is a fairly good demand for boiler tubes out of stock and the market is a little firmer. There is also less talk of extremely low prices on tubes. Specifications against contracts for merchant iron and steel pipe are slightly better and jobbers report a moderate demand. The prices seem to be well maintained.

We quote, merchant pipe and tubes, out of store, f. o. b. Chicago, as follows:

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
Butt.				
⅛ inch and ¼ inch.	71.2	50.2	63.2	42.2
⅜ inch	75.2	64.2	66.2	55.2
½ inch to 1½ inch.	78.2	69.2	71.2	62.2
Lap.				
2 inch	76.2	68.2	68.2	60.2
4½ inch to 6 inch..	77.2	68.2	69.2	60.2
Card Weight.				
7 inch to 12 inch...	74.2	63.2	67.2	56.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch	66.2	54.2	60.2	48.2
½ inch	71.2	59.2	65.2	53.2
2 inch to 3 inch...	76.2	64.2	....	....
Lap.				
2 inch	72.2	60.2	66.2	54.2
7 inch to 8 inch....	66.2	54.2	60.2	48.2
Double Extra Strong.				
Butt.				
½ inch	59.2	47.2	....	....
¾ inch to 1½ inch.	62.2	50.2	....	....
Lap.				
2 inch	60.2	48.2	....	....
4½ inch to 6 inch..	61.2	49.2	....	....
7 inch to 8 inch....	54.2	42.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	39	..	57½
1¼ to 2¼ inch	55	40	35
2¾ to 3¼ inch	65	50	46
3½ to 4½ inch	67½	50	46
5 to 6 inch	55	..	..

Cast Iron Pipe.—Additional orders for water pipe to be laid this spring are being received daily. The American Cast Iron Pipe Co., Birmingham, has been awarded 600 tons at Council Bluffs, Ia., and the United States Cast Iron Pipe & Foundry Co. has taken 2,000 tons from the Indianapolis Water Co., Indianapolis, Ind. The city of Chicago is considering proposals on 25,000 tons of various sizes of water pipe. On the award of 3,300 tons of water pipe to the American Cast Iron Pipe Co., at Minneapolis, mentioned in this report, Jan. 18, the average price is $24.90 a ton, the total cost being $82,170. The pipe ranges from 6 to 24 inches in diameter.

We continue to quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $26.50; 6 to 12 inches, $24.50, larger sizes, $24; gas pipe, $1 a ton higher.

Old Material.—The market has not been very active during the past week and there have not been sufficient transactions to afford a thorough test of the situation, which is known, however, to be weak. The Chicago, Rock Island & Pacific sold about 1,000 tons of various grades of old material last week, including 200 tons of rerolling rails. These are somewhat lower and current prices range from $12.25 to $12.75 per ton. We note a purchase of 300 tons of No. 2 wrought at $10 per net ton, Chicago. The same seller offered a small tonnage of No. 1 wrought at $11.25. The prices on pipes and flues are firm at from $8 to $8.50, Chicago.

The following prices represent the market for delivery in consumers' yards, Chicago:

GROSS TONS.	
Old car wheels	$13.00 to 13.50
Old iron rails	14.50 to 15.00
Rerolling rails (5 ft. and over)	12.25 to 12.75
Old steel rails (3 ft. and under)	11.75 to 12.25
Frogs, switches and guards	10.50 to 11.00
Heavy melting steel	10.50 to 11.00
Shoveling steel	10.00 to 10.50
NET TONS.	
No. 1 R. R. wrought	$10.75 to 11.25
No. 2 R. R. wrought	9.75 to 10.25
Arch bars and transoms	13.50 to 14.00
Knuckles, couplers and springs	10.00 to 10.50
Shafting	13.50 to 14.00
Iron car axles	18.00 to 18.50
Steel car axles	15.50 to 16.00
Locomotive tires	13.50 to 14.00
Dealers' forge	8.75 to 9.25
Pipe and flues	8.00 to 8.50
No. 1 cast	11.00 to 11.50
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.25 to 6.75
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	12.50 to 13.00
Cast and mixed borings	6.00 to 6.50
Machine shop turnings	6.50 to 7.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.25 to 9.75
Angle bars, splices, etc., iron	12.50 to 13.00
Angle bars, steel	9.75 to 11.25
Stove plate and light cast scrap	9.25 to 9.75

Cincinnati

Fair Inquiry for Pig Iron—Coke Prices Higher.

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg., Feb. 6.

Pig Iron.—The market here cannot be said to be much improved since last week. Some dealers report better inquiries and sales, but these have been mostly for lots too small to mention. In many cases they call for prompt delivery. Several interests are still asking $10.50, Birmingham, for southern foundry No. 2, but no sales are reported at this figure, and the same iron can be had on the old $10 basis. It is probably true that those quoting the higher price, in some instances at least, are doing so only because they have no iron to sell, as the orders they have booked practically cover their production for a short time, in some instances for the first quarter. The northern situation is unchanged, and $13, Ironton, is still a firm price. Sales of several small lots for delivery into the second half were recently made, this being the first iron reported sold for shipment beyond the second quarter. Dealers as a general rule are still complaining that their deliveries are somewhat handicapped by the present cold weather, and the shortage of railroad equipment, and that they are not being made on scheduled time. New inquiries in this territory include 2,000 tons of northern foundry grades for central Ohio delivery, and another central Ohio plant is considering the purchase of 400 tons of northern and 300 tons of southern analysis iron for first quarter delivery. A northern Ohio melter wants 800 tons of analysis iron for second and third quarter delivery, which probably will be divided between northern and southern grades, and there is an inquiry from the south for 600 tons of No. 2 soft, and from central Ohio for from 500 to 600 tons of low phosphorus iron. Old

inquiries reported last week, but which have not as yet been reported closed, include 6,000 tons of northern foundry iron for first half delivery, which will be bought by a Detroit interest for shipment into New York state, and 1,000 tons of charcoal iron, also for first half delivery for a central Ohio consumer. The inquiry of the Westinghouse Electric & Mfg. Co., Pittsburgh, for from 5,000 to 6,000 tons of analysis iron for second half delivery, is also still pending, and local dealers are slow to quote on it, because of the late shipment. Recent sales include 1,000 tons of a low grade northern iron which went to a southern Ohio buyer, 500 tons of southern No. 4, which was taken by a central Ohio melter, and 400 tons of northern foundry for first half delivery, which also went to an Ohio concern. In Pittsburgh, 900 tons of charcoal iron were sold from here for second and third quarter delivery, to a melter there, and also 300 tons of charcoal iron for delivery from the present date until the end of the year went to the same territory. A small sale of 150 tons of Virginia iron was also made for first half shipment to a northern Kentucky user. Princess furnace, at Glen Wilton, Va., blew in a couple of days ago, and is now making a good grade of foundry iron. Freight rates from Birmingham, $3.25, and from Ironton, $1.20. We quote Cincinnati prices as follows:

Southern foundry No. 2	$13.25 to 13.75
Southern foundry No. 3	12.75 to 13.25
Southern foundry No. 4	12.50 to 12.75
Southern gray forge	12.50 to 12.75
Mottled	12.25 to 12.50
Southern No. 1 soft	13.75 to 14.25
Southern No. 2 soft	13.25 to 13.75
Standard southern car wheel	25.25 to 25.50
Northern No. 2 foundry	14.20
Northern No. 3 foundry	13.70
Northern No. 4 foundry	13.45 to 13.70
Jackson co. 8 per cent silicon	16.45 to 16.95

Coke.—A feature in the market here has been a rise in the price of Connellsville foundry coke, and it can now be quoted from $2.25 to $2.40 for both prompt shipment and contract for second half delivery. Other prices remain unchanged. The present cold weather will probably decrease the output, and further delay shipments, which have not even been satisfactory up to the present time, and as a result prices are expected to remain firm, or, if anything, increase, during the coming week. No large contracts placed or sales made are reported, and transactions are mostly, as previously stated, in small lots for prompt shipment. Some melters are reported short of supply, but the outlook for the next few days does not indicate much encouragement in the way of better deliveries. We quote below from the leading coke producing districts as follows:

	Prompt shipment.	Contract second half.
Connellsville district:		
Foundry coke	$2.25 to 2.40	$2.25 to 2.40
Furnace coke	1.85 to 1.90	1.85 to 2.00
Wise county district:		
Foundry coke	$2.00 to 2.25	$2.00 to 2.25
Furnace coke	1.75 to 2.00	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	$2.00 to 2.10	$2.00 to 2.10
Furnace coke	1.65 to 1.75	1.70 to 1.90
New river:		
Foundry coke	$2.50 to 3.15	$2.60 to 3.25
Furnace coke	2.00 to 2.10	2.10 to 2.20

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16⅔ per cent of the amount over $9 which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—Although there is nothing new in the market here in the finished material line, several small projects are reported to be in process of formation, and may be announced in the near future. The Cincinnati Car Co., Cincinnati, has begun to manufacture all-steel traction coaches, and now has orders to build 75 such cars for western roads. Steel bars are still 1.15c, Pittsburgh; tank plates are 1.15c, Pittsburgh; black sheets, No. 28 gage, 1.90c, Pittsburgh, beams, 1.15c, Pittsburgh, and sheets, blue annealed, No. 10, 1.40c, Pittsburgh.

Warehouse business is fair, and prices are firm. Users of finished material are occasionally finding themselves short of supply, and sometimes buy in large lots. We quote warehouse prices, f. o. b. Cincinnati, as follows:

Steel bars, 1.60c base; iron bars, 1.55c base; structurals, 1.70c base; plates, ¼ inch and over, 1.70c base; sheets, blue annealed, No. 10, 1.90c base; rivets, cone head, 2.25 base; and boiler tubes as follows: 1¾ to 2¼ inch, 61 per cent discount; 2½ inch, 63 per cent discount; 2¾ to 3¼ inch, 66 per cent discount; 3½ to 4½ inch, 68 per cent discount; and 5 to 6-inch, 61 per cent discount.

Old Material.—The scrap iron market is quiet and featureless. The present cold weather cannot otherwise than have a bad effect, as it will delay the shipment of coke and other supplies to buyers, and they in turn will not buy scrap, because they cannot use it without the other materials. Prices fluctuate a little as usual, but have not advanced or decreased to any important extent during the week. There are no big lists pending here, and sales are being made mostly in small lots. According to dealers, prices are as follows:

GROSS TONS.

Old iron rails	$12.00 to 13.00
Old steel rerolling	11.00 to 11.50
Old iron axles	18.00 to 18.50
Steel melting scrap	9.50 to 10.50
Car wheels	10.50 to 11.00

NET TONS.

Old No. 1 R. R. wrought	$10.50 to 11.50
No. 1 machinery	10.00 to 10.50
No. 1 busheling	8.00 to 9.00
Stove plate	6.50 to 7.00
Machine shop turnings	5.50 to 6.00
Cast borings	4.50 to 5.00
Grate bars	6.00 to 7.00
Sheet iron, bundled	6.50 to 7.50
No. 1 cast scrap	10.00 to 10.50
Heavy turnings	6.00 to 7.00

The French Oil Machinery Co., Piqua, O., is preparing to erect a two-story and basement factory and office building.

Cleveland

More Eastern Inquiry for Iron Ore.—Long Time Contracts Made.

Office of THE IRON TRADE REVIEW, Penton Bldg., Feb. 6.

Iron Ore.—In addition to the inquiry of the Eastern Steel Co., Pottsville, Pa., for a large tonnage of ore mentioned in these columns last week, another independent steel company has sent out inquiries for several hundred thousand tons, about half of the tonnage being for manganiferous ore. Up to this time no sales have resulted from the eastern inquiries. Activity during the past week has been confined to E. N. Breitung & Co., whose sales, including several long time contracts, amounted to about 300,000 tons. An additional reservation of 50,000 tons has been made by this firm. The firm states that the sales last week of 35,000 tons of Bessemer and 15,000 of non-Bessemer were made subject to prices which may prevail later in the season when the price situation develops more definitely. The outlook for the maintenance of last year's prices is not favorable but opinions differ as to what the reduction will be. The movement of ore from docks to furnaces during the past month was light on account of the extremely cold weather. Exact statistics are not available, but the tonnage will be about half of what it was in December last year, when furnaces took 773,503 tons of ore from docks. In January last year the movement was 470,000 tons.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—The pig iron market is not active and the tonnage sold during the first week of the month has been light. The United Steel Co., Canton, O., is in the market for 2,000 tons of basic for March delivery. A

Mansfield company which has become an extensive manufacturer of gasoline tractors has inquired for from 700 to 800 tons for second and third quarter delivery. This company had bought what is supposed would be its requirements for that period, but finds that it will need the additional tonnage. For delivery in Cleveland throughout the first half, we quote as follows:

No. 1 foundry	$13.75
No. 2 foundry	13.25
No. 2 southern	14.35
Gray forge	12.50
Bessemer	15.15
Lake Superior charcoal	16.50
Jackson co. 8 per cent silvery	17.05

Coke.—The coke market is fairly active in foundry grades and prices of foundry grades are higher. There is a scarcity of stock coke and within a month the price has advanced from $1.15 to $1.70, and very little is obtainable at any price. We quote:

Connellsville furnace coke, $1.90 to $2.00 for prompt delivery, and $1.85 to $2.00 on contract; Connellsville foundry coke, $2.25 to $2.40 for prompt, and $2.25 to $2.40 on contract.

Finished Material. — Specifications against wire contracts are being received at a liberal rate and this is perhaps the most active branch of the finished material market. In some lines, particularly in bars and plates, there are price irregularities. On plates, 1.15c can be shaded. The contract for 1,500 tons of plates and shapes for a Standard Oil barge for sea service to be built by the American Ship Building Co., has been awarded to the Carnegie Steel Co. Bids are now being received on 2,000 tons for the new Cleveland & Buffalo passenger steamer. The Neal Warehouse Co. has awarded the contract for its building at Euclid and Seventy-first street to Andrew Dall & Son. About 250 tons of steel will be required. The bar iron market is extremely dull and mills are employed only about half the time.

Old Material.—Little fresh buying of scrap has been done the past week by consumers and inquiries are few. In fact, local consumers both of heavy steel and rolling mill grades appear to have covered and are not anxious to buy further. Several railroad lists, noted previously, closed at lower prices than have been prevailing. We quote gross tons, f. o. b. Cleveland, the following prices which are largely nominal:

Old iron rails	$14.00 to 14.50
Old steel rails (under 6 ft.)	11.75 to 12.00
Old steel rails (over 6 ft.)	12.00 to 12.50
Relaying rails	19.50 to 20.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	9.50 to 10.00
Malleable iron (railroad)	11.00 to 11.50
Steel axles	17.00 to 17.50
Axle turnings	8.50 to 9.50
Malleable iron (agricultural)	10.50 to 11.00
Heavy steel	11.00 to 11.50
Country mixed steel	9.00 to 9.50
Bundled sheet scrap	8.50 to 9.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.00 to 11.50
No. 1 busheling	9.50 to 10.00
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	10.00 to 10.50
Machine shop turnings	7.00 to 7.25
Pipes and flues	8.50 to 9.00
Wrought drillings	.00 to 7.25
Stove plate	9.00 to 9.50
Cast borings	6.50 to 7.00
Wrought iron piling plate	15.50 to 16.00
Wrought iron arch bars	15.50 to 16.00

Philadelphia

More Ship Building Contracts Placed —Market Not Greatly Changed.

Feb. 5.

There are few new matters of market value to characterize eastern iron and steel conditions. The demand for finished products shows little, if any, expansion and while eastern mills have been making steel at a little higher rate, some are having trouble to maintain this activity. The unusually active ship building conditions along the Atlantic continues to direct some large contracts to seaboard yards. The pig iron market shows little change from recent quietness. Old material remains dull.

Pig Iron.—Shipments of metal on contracts continue at an undiminished rate, but new buying is in small volume. That some eastern makers have been able to maintain a substantial selling activity is shown by the fact that a steel company which has been aggressive in the merchant trade has disposed of 30,000 tons of various grades during each of the past two months. Pipe iron, which has been moving in considerable volume of late, is still in active demand, but some consumers in the Delaware river district which are sounding the market have met with a scarcity in southern lower silicon material. This condition results from the recent heavy purchasing done in that district chiefly by the largest cast iron pipe manufacturer, the sales to which it is now learned reached 50,000 tons or more. This buyer also recently took 3,000 tons of low grade iron from a Lehigh valley maker for shipment in this territory. Northern pipe iron is usually bringing from $14 to $14.25, delivered, and southern metal of similar character from $13.50 to $13.75, delivered, the latter being equivalent to $9.25 to $9.50, Birmingham. Virginia pipe makers which were recently inquiring for about 10,000 tons, have made some purchases, one sale of 1,000 tons for early shipment being noted. The demand for No. 2X is light and is made up of small sales. Prices range from $14.75 to $15, delivered, with a few lots going as high as $15.25, delivered. These prices usually net about $14.25, eastern Pennsylvania furnace. One good-sized sale of No. 2 plain on the basis of $14, Lehigh valley furnace, is noted. Virginia 2X is now being more openly offered at $12.25, furnace, for second quarter, though some makers ask $12.50. An eastern Pennsylvania iron mill is out for about 1,000 tons of standard forge for March-April shipment. This grade is quoted from $14 to $14.25, delivered. Steel making grades are in light demand. Basic holds around $14.25, delivered in eastern Pennsylvania territory. A Philadelphia buyer has purchased a small lot of malleable and is still inquiring for 500 tons for early shipment. Malleable is quoted at $15.50 to $15.65, Philadelphia. Small sales rule in low phosphorus iron.

We quote, delivered in Philadelphia and nearby territory, as follows, shipping and handling charge being included for Virginia and southern iron:

No. 1X foundry	$15.25 to 15.50
No. 2X foundry	14.75 to 15.25
No. 2 plain	14.50 to 14.75
Standard gray forge	14.00 to 14.25
Basic	14.25
No. 2X Virginia	15.50 to 15.75
No. 2 southern	14.50 to 15.00
Standard low phosphorus	19.00 to 19.50

Finished Material.—Several eastern steel companies, including the Pennsylvania Steel Co., the Alan Wood Iron & Steel Co., the Eastern Steel Co., and some others, in January turned out a moderately increased ingot tonnage over December. This plane of operations on the whole is still being maintained, but some of the mills are having difficulty to do this, as they are working out their former contracts and are replenishing these with greater difficulty. New business is not active nor of a large volume.

Prices continue to reflect the spotty character of the market. Plates and shapes are usually quoted at 1.15c to 1.20c, Pittsburgh, or 1.30c to 1.35c, Philadelphia, but are shaded on desirable orders. Steel bars seem pegged at 1.15c, Pittsburgh. Eastern bar iron makers aim to hold the product at about 1.18c to 1.23c, mill, or 1.25c to 1.30c, Philadelphia, but sales usually fall within the range of 1.22c to 1.27c, delivered. Sheets seem firmer in this district and are selling at 1.40c to 1.45c, Pittsburgh, or 1.55c to 1.60c, Philadelphia, on No. 10 blue annealed. Very active specifications in rails and wire were taken in this

market in January as the result of the recent price advance.

From 10,000 to 12,000 tons of structural material is on the verge of closing in this territory. The Geo. A. Fuller Co. has the general contract for the addition to the Bellevue-Stratford hotel and the fabricated steel, which may reach 2,500 tons, will probably go to the American Bridge Co. Geo. F. Payne & Co. have the general contract for the stock exchange, this city, 2,000 tons. Bids went in this week on the Manufacturers' Club, this city, 2,300 tons, and on the addition to the plant of the J. B. Stetson Co., this city, which will reach 1,000 to 1,200 tons, for which Bethlehem sections are specified. Decision is about to be made on the power house for the Lehigh Coal & Navigation Co., at Lansford, Pa., about 2,500 tons. The Lasher building, this city, which has gone concrete, will require from 750 to 1,000 tons of plates and shapes for columns. Plans for the new Vendig hotel, this city, are about ready. The McClintic-Marshall Construction Co. has placed 3,800 tons of plain material with an eastern mill for the requirements of the Boston & Maine shops at Bellerica, Mass. A buyer in this territory continues in the market for 1,500 to 3,000 tons of plates and shapes for gas holder construction.

We quote, delivered in Philadelphia and vicinity, as follows:

Structural shapes, 1.30c to 1.35c; steel plates, 1.30c to 1.35c; steel bars, 1.30c; common bar iron, 1.25c to 1.30c; cut nails, 1.65c to 1.70c; blue annealed sheets, No. 10 gage, 1.55c to 1.60c; 4 x 4-inch open-hearth rolling billets, $22.40 to $23.40; forging billets, $26.40 to $27.40. Extras shown under Pittsburgh report.

Semi-Finished Material.—Additional instances are to be noted of eastern makers taking orders for billets for shipment into the Pittsburgh district, to make up for arrearages to customers of some of the heavily-booked mills in that territory, which have fallen behind on their contracts. A fair volume of billet business is being entered by eastern mills at unchanged prices of $20 to $21, Pittsburgh, or $22.40 to $23.40, Philadelphia, on re-rolling steel and $24, Pittsburgh, or $26.40, Philadelphia, on forging steel.

Ship Building Work.—Additional ship building contracts of important size have been placed from the large list of inquiries that continues before eastern yards. W. R. Grace & Co., owners of the Merchant Steamship Line, have placed a contract with the Wm. Cramp & Sons' Ship & Engine Building Co. for a 10,000-ton steamer for Panama canal service which will be the first vessel of this line under American register. The Coastwise Transportation Co. has contracted with the New York Ship Building Co. for a coal-carrying steamer of 7,200 tons capacity, which will be a duplicate of the Suffolk of this line. The Standard Oil Co. is negotiating for two oil steamers of large size. It develops that the large inquiry for steamships of the Southern Pacific railroad interests, upon which bids have been entered by eastern builders, calls for four boats. These will probably be of 10,000 tons burden, though there have been some reports that they might be 20,000-ton ships. Each vessel will be over 600 feet in length and will require 10,000 tons of plates and 5,000 tons of shapes, or 60,000 tons in all. Bids have been entered upon this work and an award is expected soon.

Old Material.—Odd lot buying is about the only manifestation of interest on the part of consumers in old material. Prices are accordingly easy and incline lower. Occasional lots are bringing fair values under ruling conditions. A small sale of first class heavy melting steel at $12.25, delivered, is noted. There is little doubt but that some No. 1 railroad wrought has sold as low as $14, delivered in eastern Pennsylvania, but usually $14.25 and $14.50, delivered, can be obtained on this grade. Turnings are of limited supply and are holding firmly. The Pennsylvania, Reading, Lehigh Valley and other railroads are closing on their monthly lists this week, which are noticeably smaller than usual.

We quote, gross tons, delivered in eastern Pennsylvania and New Jersey consuming territory, as follows:

Old iron rails	$15.75 to 16.25
Old steel rails (rerolling)	13.75 to 14.25
No. 1 heavy melting steel	11.75 to 12.25
Old car wheels	12.00 to 12.50
Old iron axles	22.00 to 23.00
Old steel axles	17.00 to 17.50
No. 1 railroad wrought	14.25 to 14.75
Wrought pipe	11.50 to 12.00
Cast borings	8.00 to 8.50
Machine shop turnings	9.00 to 9.50
Heavy cast	12.50 to 13.00
Malleable	11.75 to 12.25
Stove plate	10.00 to 10.25

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg and Steelton, Pa.; $1.40 to Milton, Pa.

Locomotives Placed. — The Buffalo Creek railroad has placed an order for four six-wheel switching locomotives with the American Locomotive Co. Other orders recently taken by that builder include one eight-wheel passenger locomotive for the Catskill Mountain railway and one ten-wheel locomotive for the Lowville & Beaver River railroad.

St. Louis

Pig Iron Inquiries Confined to Small Lots—Coke More Active.

Feb. 5.

Pig Iron.—A number of inquiries for small lots of pig iron, the largest being for 600 tons of southern No. 4 for shipment over the first quarter and half, are in the market in the St. Louis territory, but buying has almost dropped off, and the only encouraging sign seems to be in the active inquiry for coke prices.

Our tabulated quotations on southern pig iron, delivered, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$14.50 to 14.75
Southern No. 2	14.00 to 14.25
Southern No. 3	13.50 to 13.75
Southern No. 4	13.00 to 13.50

Coke. — Sales of coke have been few and only for small lots, but inquiry has been quite brisk. Prices have stiffened somewhat, especially for Connellsville foundry grades. Our tabulated quotations remain as follows:

We quote 72-hour Connellsville foundry grades, $2.15 to $2.40 for first half of 1912; 72-hour foundry, $2.15 to $2.25 on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.75 to $1.80; best 72-hour Virginia foundry, $2.15 to $2.25; 48-hour Virginia furnace, $1.75 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material.—A contract let Friday by James Block for 1,100 tons of structural steel for a building to be erected on St. Charles street in St. Louis, is about the largest transaction reported recently.

Old Material.—Buying of scrap iron has fallen to the minimum, and prices remain unchanged as follows:

GROSS TONS.

Old car wheels	$13.00 to 13.50
Old iron rails	14.00 to 14.50
Re-rolling rails (5 feet and over)	12.00 to 12.50
Old steel rails (3 feet and under)	10.75 to 11.25
Light section relayers (45 lb. and under) subject to inspec.	20.00 to 21.00
Re-laying rails, subject to inspec.	23.50 to 24.00
Frogs, switches and guards	10.00 to 10.50
Heavy melting steel	10.50 to 11.00
Shoveling steel	10.00 to 10.50

NET TONS.

No. 1 railroad wrought	$10.50 to 11.00
No. 2 railroad wrought	9.50 to 10.00
Arch bars and transoms	13.00 to 13.50
Knuckles, couplers and springs.	9.00 to 9.50
Shafting	13.00 to 13.50
Iron car axles	17.00 to 17.50
Steel car axles	15.00 to 15.50
Locomotive tires	14.00 to 14.50
No. 1 country wrought	8.75 to 9.00
Pipe and flues	7.50 to 8.00
Tank iron and cut boilers	7.00 to 7.25
No. 1 cut busheling	8.50 to 8.75
No. 2 cut busheling	6.00 to 6.25
Cast and mixed borings	5.25 to 5.50
Machine shop turnings	6.25 to 6.50
Railroad malleable	9.50 to 10.00
Agricultural, malleable	8.50 to 9.00
Stove plates	8.75 to 9.25
Angle splice bars (iron)	10.50 to 11.00
Angle splice bars (steel)	9.25 to 9.50

Buffalo

Some Increase in Activity of the Pig Iron Market.

Feb. 6.

Pig Iron.—The situation is taking on a more active front, owing to several sizable inquiries being placed on the market during the past week, bringing the tonnage under consideration up to about 15,000 of foundry grades. Sales have been a little better than for the previous week. The general situation seems stronger and the demand for all grades of iron, under contract, very heavy. The Rogers-Brown Iron Co. yesterday fired its new No. 3 furnace. This was planned and construction started in 1910, and it was recently completed. The company's No. 4 stack is still in the course of erection. The putting in blast of both will double the capacity of the plant.

The prices quoted last week still prevail. We quote, f. o. b. furnaces, substantially as follows:

No. 1X foundry	$13.75 to 14.25
No. 2X foundry	13.75 to 14.00
No. 2 plain	13.50 to 13.75
No. 3 foundry	13.25 to 13.50
Gray forge	13.25
Malleable	13.75 to 14.25
Basic	14.00 to 14.50
Charcoal	15.75 to 17.25

Finished Material. — The inquiry continues light, for the bulk of consumers apparently covered their requirements before the close of the last year, at the prices then prevailing. The market has not fluctuated and remains as firm as it has been so far during this quarter. The mills are receiving specifications on old contracts quite freely, especially on bars, plates, and quite a little structural material. While the outlook for new business has not improved, the demand for material under contract has held the prices firm. The disposition of the mills to consider only proposals for delivery within the first quarter, in order to keep from tying up their output at the present prices, still continues. A number of tonnages for second quarter deliveries have been declined.

In the wire nails and wire products line, both the Corporation and the independents report a continuation of the volume of buying. The prices of $1.60 and $1.40 base still prevail and are expected to hold for another month at least. The mills, in order to meet the tonnage demands, have so far been unable to stock ahead, in order to meet the spring buying, and if that comes up to the tonnage of last year, it is expected that deliveries will have to be extended for two or three months.

Plans for the Buffalo Natural Gas & Fuel Co.'s new building, requiring about 700 tons, will be ready in about two weeks. The architects are Wood & Bradney, Buffalo. The same architects are working on plans for an addition to the Sidway building, requiring about 150 tons.

Old Material.—The market is rather quiet, although there is a good demand for heavy melting steel. Weather conditions still continue to retard deliveries, as the dealers are unable to get at the stocks on their yards. They are confining transactions largely to material in cars, not caring to contract on larger lots, where there is a possibility of being compelled to wait several weeks before being able to get out the material. The reluctance to sell under these conditions is due to the general belief that prices will move up. Dealers short on heavy melting and car wheels are paying more than consumers to fill orders. A change in the market is looked for with a break in the weather. We quote $12.00 to $12.75 on heavy melting, although one consumer claims to have made purchases within the week at $11.75 to $12.

The following prices on gross tons, f. o. b. Buffalo, prevail in this district:

Heavy melting steel	$12.00 to 12.75
No. 1 railroad wrought scrap	14.00 to 14.25
No. 1 R. R. and mch. cast scrap	13.50 to 14.00
Old steel axles	18.50 to 19.00
Iron axles	22.00 to 23.50
Car wheels	12.75 to 13.00
Railroad malleable, scrap	12.50 to 12.75
Wrought iron and soft steel turn.	7.25 to 7.50
Cast iron borings	6.75 to 7.00
Low phosphorus steel scrap	15.25 to 15.50
Old iron rail	15.00 to 15.50
Tank iron	10.00 to 10.25
Boiler plate, sheared	13.75 to 14.25
Pipe and tank	10.00 to 10.50
Stove plate	9.75 to 10.00
Sheet iron	7.00 to 7.50
Locomotive grate bars	11.00 to 11.25

British Market

Pig Iron Has Eased Off While Steel Trade Holds Up.

Office of THE IRON TRADE REVIEW,
Princes Chambers, Corporation St.,
Birmingham, Eng., Jan. 27.

Pig Iron.—Makers of pig iron have had a rather disappointing week. Prices are now down to the level which prevailed early in December. This week the minimum has been 48s 10d ($11.96), representing a fall of 1s 10d from the beginning of the year. The bad weather has partly accounted for this, as the shipments, both coastwise and foreign, are smaller than were expected. There has been an increase in warrants, and stocks are accumulating, the amount in store now being 529,000 tons. In the hematite department prices continue to rise, the total advance in East Coast hematite being quite 6s per ton, while makers can readily sell all they can produce. Much reliance is placed upon the heavy orders for ship building, which will require to the end of the year very large quantities of ship plates.

Finished Iron and Steel.—The cablegram received this week from The Iron Trade Review making the first announcement of the order placed with a Pennsylvania mill for 1,000 tons of ship plates for delivery in Glasgow, has excited a great deal of interest in steel circles, and was a good deal discussed on the Birmingham iron exchange. In view of the rising ocean freights, British makers are inclined to think that this deal has hardly been made as a genuine trading transaction, and are not looking for avalanches of American steel from the same quarter. But the order has an added significance from the fact that a conference has been held at Glasgow this week between representatives of the Scottish steel makers and of the Clyde ship builders with regard to the recently inaugurated rebate of 5s per ton. The ship builders have asked that the scheme should be withdrawn and it is said that the steel makers have promised to consider the arguments put before them and communicate their decision. The local steel merchants are still making strenuous efforts to bring in American billets and practically every American firm likely to ship steel has been applied to, the correspondence having been almost voluminous. As the matter now stands, the best selling figure that can be obtained here is £5, delivered to the consumer. At the present time, British steel is selling at £5 5s, but the saving of 5s, in view of the delay in obtaining supplies and the requirement to pay cash on documents, is not sufficient to encourage the British buyer to send his money to America. The British steel trade continues very busy, but with rather less pressure for deliveries. The price of British billets has eased a little, but there is a full output being made.

The board of directors of the Hamilton-Otto Coke Co., Hamilton, O., recently organized by electing the following officers: President, S. M. Goodman; vice president, F. S. Garrison; secretary and treasurer, W. A. Eberson; executive committee, Mr. Garrison, Mr. Goodman and G. P. Songen. The business will be continued and the plant put on the capacity operating basis as soon as possible.

METAL MARKETS

St. Louis

Feb. 5.

Lead and Zinc.—Zinc blende brought a top price of $49 a ton in the Missouri-Kansas-Oklahoma district last week, on an assay base of $46 a ton for 60 per cent ores. The base price ranged down to $42. Extra choice lots sold as high as $49.

Lead ore slumped from $60 to $55 a ton, with the metal declining from $4.40 to $4.17, East St. Louis, Ill.

The demand for calamine was good, and prices ranged from $23 to $26 a ton for 40 per cent grades, choice lots selling as high as $49.

Chicago

Feb. 6.

New Metals.—The copper market is quiet and prices have developed some weakness. The demand for tin and spelter is also somewhat less active. Lower prices are noted both for spelter and lead.

We quote, f. o. b. Chicago, as follows:

Lake copper, carload lots, 14½c; casting, 14¼c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 6.35c; lead, desilverized, 4.20c to 4.25c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $8 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 43¾c. Cookson's antimony, 8¾c; other grades, 7½c to 8¼c.

Old Metals.—A summary of the situation indicates that the old metal market in the west made very little progress during January and conditions are practically the same as they were at the opening of the year. Recently the tone of the market has been if anything a little quieter.

We quote, f. o. b. Chicago, as follows:

Copper wire, crucible shapes, 13c; copper bottoms, 11c; heavy cut crucible copper, 11½c; heavy red brass, 11¾c; heavy yellow brass, 9½c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 8¼c; brass clippings, 8½c; lead pipe, 5c; zinc scrap, 6c; scrap aluminum, 12c; tea lead, 3¾c; No. 1 pewter, 28c; block tin pipe, 39c; tin foil, 35c; linotype dross, 3¼c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3½c; prime slab zinc dross, $80 to $85 a ton.

Atkins Pioneers.—The Atkins Pioneers celebrated the sixth anniversary of their organization by holding a banquet at the Spencer House, Indianapolis, on Jan. 27. The program included a number of toasts which were called for by Frank E. Kingsley, president of the organization, the initiation of the "Fresh Fish", and a number of vocal selections by the Atkins quartet. The membership of the Atkins Pioneers is made up of those employes who have been associated for 20 years or longer with E. C. Atkins & Co., manufacturers of "Silver Steel" saws, Indianapolis. In view of the fact that from the entire Atkins pay roll of 176 employes in 1886, the Pioneers now retain a membership of 122, the record may be considered as remarkable. The oldest member of the organization, who retired from active service in 1909 after a continuous service of 45 years, is now enjoying a pension.

Officers Elected By Niles Tool Works

At the annual meeting of the stockholders of the Niles Tool Works, Hamilton, O., which was held in that city on Jan. 30, the following directors were chosen: R. C. McKinney, James K. Cullen, George T. Reiss, Miles T. Watts and J. L. Blair. The directors then organized by electing the following officers: President, James K. Cullen; vice president, George T. Reiss; secretary, James L. Blair; assistant secretary, Miles T. Watts; treasurer, Charles Cornell, and assistant treasurer, L. B. Potter.

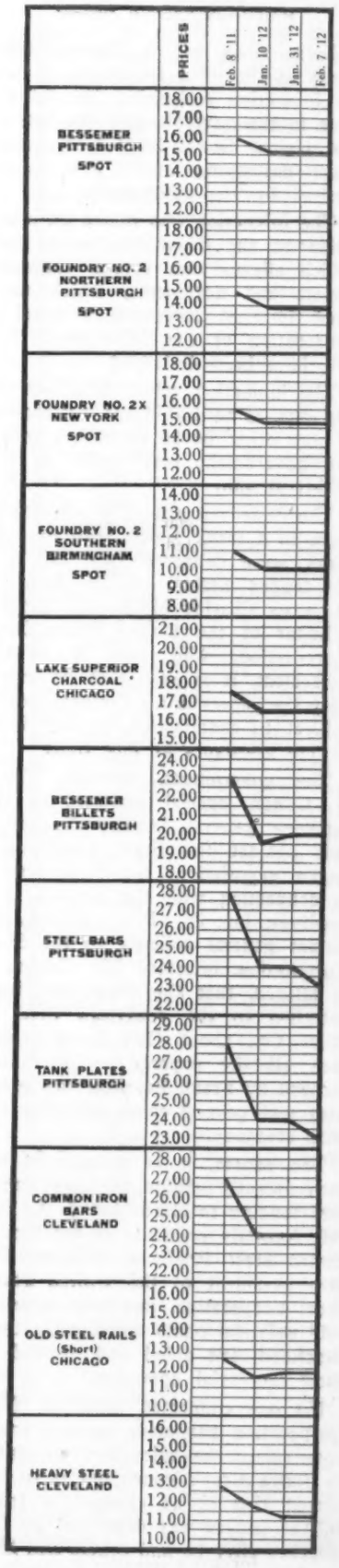
Increased Capital for Inland Steel Co.

Directors of the Inland Steel Co. have recommended to stockholders an increase in capital stock and a special meeting of stockholders has been called for March 5, to vote on the proposition. It is said that no definite plan as to how the stock will be issued has been agreed upon by the directors. The authorized capitalization was increased a year ago from $6,000,000 to $7,500,000, and of the new capital, $900,000 was issued at $125 a share. The outstanding capital on June 30, 1911, was given as $6,316,820.

Draw Plans for New Foundry

Vanderwest & Pease, architects and civil engineers, Muskegon, Mich., advise that the report to the effect that they are prospective foundry owners is incorrect. They are merely preparing plans for a foundry to be erected in spring.

PRICE CHART



PAPERS DESTROYED

After Baackes and Others Were Fined—Injunction Issued.

Judge Gray, in the United States court of the third circuit, has issued an injunction restraining the defendants in the government's suit against the United States Steel Corporation from destroying books and papers desired by the government.

The injunction was issued on a petition of the department of justice, which alleges that several thousand papers and documents, which were used in the government's criminal prosecution of the "wire pool" last fall, have been destroyed.

The injunction, which is a temporary one, is to forbid the destruction of any other books or papers which the government may desire in the anti-trust suit.

The destroyed papers, it is charged, were in a trunk which, with its contents, were delivered June 29, 1911, by United States District Attorney Wise to Charles MacVeagh, general solicitor of the United States Steel Corporation, who gave a written agreement, it is said, that he would keep the papers in his personal charge subject to examination by Mr. Wise or his assistants at any time.

The government, through Henry E. Colton, special assistant to the attorney general in the dissolution suit against the Steel Corporation, began negotiations for these papers in connection with the pending proceedings, Jan. 26. R. C. Bolling, assistant general solicitor of the Steel Corporation, informed Mr. Colton, it is alleged, that the trunk had been returned to the American Steel & Wire Co., about Oct. 1, 1911, and that all the papers had been destroyed by Frank Baackes, vice president and general sales agent for the wire company.

The papers, it is charged in the government's petition, "contained matters tending to show that J. A. Farrell, formerly president of the United States Steel Products (Export) Co., now president of the United States Steel Corporation, not only knew of said unlawful pools and combinations described, but aided and abetted in their successful operation."

No one connected with the Steel Corporation has made any statement concerning the allegation presented in Judge Gray's court, but it is presumed that if, as charged, a trunk full of papers was destroyed by Mr. Baackes after he and others had been fined, he did so because he thought the papers were of no further value to himself or to anyone else. No one is supposed to be put in jeopardy twice for the same offense.

Eliot A. Kebler Addresses Foundrymen

The monthly meeting of the Pittsburgh Foundrymen's Association was held Monday evening, Feb. 5, at the assembly room of the Engineers' Society of Western Pennsylvania. The members of the Associated Foundry Foremen came as invited guests. Unfortunately, the speaker of the evening, William H. Wood, foreman of the brass shop of the Pennsylvania Lines West, of Pittsburgh, was prevented from being present owing to illness in his family. He was to have presented a paper on "Brass". In his place, Eliot A. Kebler, resident agent for M. A. Hanna & Co., of Cleveland, obligingly filled the vacancy and presented one of the most interesting papers of the season. Mr. Kebler took up iron ore, after telling in simple language what iron ore is, and followed it through the various processes of manufacture until it had reached numerous forms of finished steel. He also presented typical analyses and specifications of iron ore, pig iron and iron castings.

Investigating Grant Bridge

The state senate of New Jersey has passed a bill appropriating $25,000 for the establishment of a commission to investigate the subject of building a bridge or tunnel across the Hudson river between Hudson county, New Jersey, and New York City. The project for a bridge across the Hudson connecting Manhattan Island with New Jersey has been receiving more or less consideration in recent years from the authorities of the two states. Some private enterprises for carrying out a similar purpose have also been launched. Recently borings were taken and examined from one of the proposed locations for the structure. The bridge, if built, will be of gigantic proportions.

Foreign Rail Trade

A few new inquiries have come before makers of steel rails during the week, these including 32,000 tons of 80's for New South Wales, 14,500 tons of 80's for the trans-continental railway commission of Ottawa, and 2,000 tons of 60's for Burma. Apart from this, however, there is nothing fresh to report, actual booking during the week having been practically at a standstill.—*The Ironmonger.*

RECEIVERS NAMED

For Central Iron & Steel Co., of Harrisburg, Pa.

New York, Feb. 7. (By wire.)—Upon application of Henry Gilbert & Son, creditors, and Mrs. Sarah G. McCawley, a stockholder, both of Harrisburg, receivers have been appointed for the Central Iron & Steel Co., of Harrisburg, by the county courts. Inability to convert a large stock of raw materials into money is generally reported as the cause for action. Receivers which include J. V. W. Reynders, vice president of the Pennsylvania Steel Co., have authority to operate the plant as well as to purchase and sell material.

The Central company was formed in 1897 by the consolidation of the Central Iron Works, Chesapeake Nail Works, Paxton Rolling Mills and Paxton Furnaces, all of Harrisburg. The plant includes two blast furnaces, rolling mills and open-hearth steel works. Of the capital stock of $5,000,000, about $2,000,000 has been issued and there is a bond issue of $1,239,000.

Annual Report of American Can Co.

The annual report of the American Can Co. just published as of Dec. 31 last shows net earnings of $5,416,339, an increase of $1,959,802; depreciation, $2,500,000, an increase of $1,866,436; balance, $2,916,339, an increase of $93,366. New construction increased $1,253,138, while surplus is now $7,675,738, an increase of $885,850.

President William T. Graham said: "The lessening prejudice against canned food is largely due to the pure food commission's prevention of the sales of foods improperly packed. It is too early at this time to intelligently estimate the prospects for 1912 business. One promising condition, however, is that packers of canned goods have generally disposed of their old stocks and are encouraged to operate in the coming season as nearly to capacity as their facilities may permit."

Retiring directors of the company were re-elected.

These officers were elected at the annual meeting of the Youngstown Bronze & Iron Co., recently held: President, Grant S. Jones; vice president, John W. Wright; secretary and treasurer, Fred C. Noll; manager, J. Watson Long. The reports presented show that the business is in a prosperous condition.

BASIC STRONGER

Sales Made at Advance—Contract for Line Pipe.

Pittsburgh, Feb. 7. (By wire.)—Basic shows some increased strength. Sales made in small lots are reported at $12.45. Bessemer, while continuing quiet, is also strong. The billet market is showing increasing firmness in the Pittsburgh territory. There is more tonnage coming to the independents and absorbing their stock.

The Jones & Laughlin Steel Co. this morning ordered one stack at Aliquippa to be blown in at once. A second one is likely to be blown in before the end of the month. This precludes this company making any further purchases of pig iron for the open-hearth works at Aliquippa.

A local interest is reported to have closed for 40 miles of 12-inch line pipe for Ohio delivery. The announcement of the placing of the contract has been withheld temporarily.

Lynchburg Foundry Co. in Good Condition

At the recent annual meeting of the Lynchburg Foundry Co., Lynchburg, Va., the reports submitted to the stockholders by the president and treasurer showed the company's affairs to be in excellent condition. The volume of business for the past year, in both the pipe and plow departments, exceeded that of any previous year. The orders on the books for future shipment are also in excess of those on the books a year ago. The following board of directors was elected: H. E. McWane, F. S. Kirkpatrick, W. C. Ivey, W. W. Lynn, L. H. McWane, Richard Hancock and E. C. Wiley. The directors organized as follows: President, H. E. McWane; vice president, F. S. Kirkpatrick; secretary and treasurer, L. W. Walsh.

Alliance Company to Make Large Crane

The Alliance Machine Co., Alliance, O., has received an order from the Carnegie Steel Co., for installation at its Homestead works, for what is said to be the largest single trolley electric traveling crane ever designed. The crane will have a lifting capacity of 200 tons and a bridge span of 50 feet. It will be of what is known as "all-steel construction" and will embody the latest improvements in electric traveling cranes. The Alliance Machine Co. has also booked the following orders recently:

One 40-ton, one 45-ton and one 55-ton crane for the Appalachian Power Co.; one 20-ton crane for the Lorain Steel Co.; one 30-ton crane for the Wheeling Mold & Foundry Co., one 40-ton crane for the Scullin-Gallagher Iron & Steel Co.; one 10-ton crane for the Lehigh Valley Structural Steel Co.; one 10-ton crane for the Midvale Steel Co.; one 75-ton and two 150-ton cranes for installation at the Keokuk, Ia., power plant of the Hydraulic Engineering Co., of Maine; one 15-ton crane for the DeForest Sheet & Tin Plate Co.; one 10-ton crane for the Pittsburgh Valve & Fittings Co.; one 5-ton crane for the Orford Copper Co.; one 5-ton bridge for the La Belle Iron Works; two 7½-ton vertical charging and drawing ingot cranes for the soaking pit department of the Indiana Steel Co.; one horizontal slab charging and drawing crane and one additional charging trolley for the American Sheet & Tin Plate Co.; one 4-ton pillar crane for the General Electric Co.; four 5-ton, two 10-ton, one 15-ton and one 20-ton crane for the Massillon Bridge & Structural Co.; one 10-ton, 100-foot span gantry crane for the same company; one 10-ton crane for the Carnegie Steel Co.; two electric coke pushers and levelers, one for H. Koppers' new plant at Joliet, Ill., and the other for the Woodward Iron Co.

Machine Tool Makers Protest Against Free List

The delegation of representatives of the different machine tool manufacturers of Cincinnati, which is in Washington to protest against the removal of the tariff on their respective products, will appear before the senate committee of finance, Feb. 9 or 12, to present their arguments against the placing of machine tools on the free list. It is understood that the protest will be based upon the fact that the Underwood bill cannot be justified in that it proposes to place machine tools on the free list, and at the same time impose a tax upon the raw materials from which these products are made.

Rebuilding of Upson Stack Under Way

Work on remodeling the Upson Nut Co.'s stack, Cleveland, is now under way. All lines in the furnace will be changed, a new bustle pipe and a new hearth jacket will be constructed and two of the boilers will be rebuilt. The P. J. Brown Construction Co., Cleveland, has the contract for the brick work. It is expected that the work will be completed and the furnace ready for the blast by April 1. The Upson Nut Co. is also building its fifth open-hearth furnace, space for which was provided when the recently completed steel plant was designed.

The Bon Air Coal & Iron Co. will resume operating the Allen's Creek stack which is now banked for repairs. The blast will be turned on about Feb. 20.

ALL STEEL BOX CARS

Will be Purchased by the Bessemer Railroad.

Because of the rather extreme character of the step and the effects involved upon general road bed and line construction, some of the leading railroad systems are moving very slowly with the proposal to put in service freight car rolling stock of 70 tons or 140,000 pounds capacity. The Pennsylvania railroad, which has been one of the leaders in considering the adoption of this type of car, has not yet placed any orders for trucks sufficiently heavy to carry such a load capacity. A number of the freight cars recently ordered by this system, however, have been designed with upper works of 70-ton bulk capacity. Any time the company so decides, these cars can be readily equipped with trucks of sufficient weight to bear the maximum load. The Baltimore & Ohio railroad has also been giving this matter considerable attention and will probably equip with 70-ton trucks about 1,000 of the freight cars now being built for it. Another interesting design of rolling stock which the railroads have been considering for several years past, is that of the all-steel box car. The Bessemer & Lake Erie railroad, a subsidiary of the United States Steel Corporation, now has specifications before builders for the construction of 500 cars of this class. This road has been figuring on an all-steel box car for several years past but has not yet put any of this type in service.

Structural Contracts Awarded

New York, Feb. 7. (By wire.)—The Oregon Electric Railway has placed 2,350 tons for a bridge in Oregon with the Pennsylvania Steel Co. It is now officially announced that the American Bridge Co. has 3,200 for the Coca Cola building, this city and 2,200 for additions to the Bellevue Stratford, Philadelphia. The Standard Oil has placed a contract for two oil carriers with an eastern ship yard to require several thousand tons. The Bethlehem Steel Co. has taken 2,000 open-hearth rails for Panama.

The Ironton Punch & Shear Co., Ironton, O., has increased its capital stock from $30,000 to $75,000.

The Detroit Art Metal Co., Detroit, has incorporated for $10,000.

January's Pig Iron Output Shows Slight Gain

Production 20,505 Tons Above December's Due to Activity at Steel-Works Stacks — 12 More Furnaces in Blast

Complete returns from the blast furnaces of the country give a total output of anthracite and coke pig iron during January of 2,052,806 tons, compared with 2,032,301 tons in December, an increase of 20,505 tons. The daily average output in January was 66,220 tons, compared with 65,558 tons in December, an increase of 662 tons.

The increase was due entirely to greater output by the non-merchant or steel-works stacks, since the production of merchant iron in January was 557,311 tons, compared with 561,304 tons in December, a decrease of 3,993 tons. The steel-works stacks produced 1,466,943 tons, an increase of 24,034 tons over December's production, 1,422,909 tons.

AVERAGE DAILY PRODUCTION.

	1912.	1911.
January	66,220	56,989
February	.....	63,617
March	.....	69,863
April	.....	68,163
May	.....	60,367
June	.....	59,109
July	.....	57,294
August	.....	61,995
September	.....	65,797
October	.....	67,486
November	.....	66,637
December	.....	65.558

Stacks in blast on the last day of January numbered 227, compared with 215 in December, an increase of 12. Of the latter, nine were relighted in Pennsylvania alone. The changes during the month included the blowing in of 14 steel-works stacks and five merchant stacks, and the blowing out of one steel-works stack and six merchant stacks.

The production of spiegel in January was 6,423 tons, compared with 7,804 tons in December, a decrease of 1,381 tons. January's output of ferro was 22,129 tons, compared with 20,284 tons in December, an increase of 1,845 tons.

MONTHLY PRODUCTION.

	1912.	1911.	1910.
January	2,052,806	1,766,658	2,599,995
February	.....	1,781,285	2,429,525
March	.....	2,165,764	2,588,736
April	.....	2,044,904	2,477,700
May	.....	1,871,388	2,374,802
June	.....	1,773,282	2,288,279
July	.....	1,776,108	2,158,124
August	.....	1,921,832	2,103,793
September	.....	1,973,918	2,048,461
October	.....	2,092,061	2,086,205
November	.....	1,999,100	1,910,385
December	.....	2,032,301	1,779,899
Total	.....	23,198,601	26,845,904

Its Annual Meeting.—The Cleveland branch of the National Metal Trades Association will hold its annual meeting on March 7. A number of speeches will be made and the program will include the election of officers to serve during the coming year.

Lycoming Foundry & Machine Co., Williamsport, Pa., has increased its capital stock from $100,000 to $150,000.

JANUARY PIG IRON.

States.	No. of stacks.	No. in blast last day of month.		Total tonnage made.		——Totals.——	
		Jan.	Dec.	Merchant.	Non-Merchant.	Jan.	Dec.
Pennsylvania	157	97	88	116,598	712,659	879,257	845,731
Ohio	71	47	43	124,013	356,430	480,443	445,879
Alabama	45	18	20	112,973	33,239	146,212	161,976
Virginia	23	7	7	24,327	.....	24,327	22,757
New York	27	13	13	52,727	65,797	118,524	124,389
New Jersey	7	..	..	.....	.....	.....	.....
Illinois	24	14	14	21,507	142,723	164,230	176,790
Colorado	6	3	3				
Indiana	9	8	7				
Maryland	4	3	3				
Wisconsin	6	4	3	19,223	130,257	149,480	158,088
Kentucky	7	1	1				
West Virginia	4	3	3				
Tennessee	18	7	7				
Washington	1	.	.	22,943	25,838	48,781	57,484
Georgia	2	.	.				
Texas	3	.	.				
Minnesota	1	.	1				
Michigan	3	2	2				
Missouri	1	.	.	13,000	.....	13,000	11,119
Spiegel—All states						6,423	7,804
Ferro—All states..						22,129	20,284
Totals	419	227	215	557,311	1,466,943	2,052,806	2,032,301

CHARTER SECURED

Middle Western Sheet and Tin Plate Makers Incorporate.

A number of independent tin plate and steel sheet manufacturers of the middle west have been granted a charter at Pittsburgh under the name of the Association of Sheet & Tin Plate Manufacturers, the capital stock being placed at $100,000,000. It is proposed to establish headquarters at Pittsburgh.

The statement is made that no attempt will be made by the manufacturers affiliated to fix the prices of products, it being formed for "the encouragement and protection of trade and commerce." Competent legal counsel, it is said have declared that the announced purpose of the association is not in conflict with the Sherman anti-trust law. The export trade and transportation, labor conditions, installation of safety devices, and social meetings of members are declared to be among the objects of the organization. This chartering follows a meeting of sheet and tin plate manufacturers held some weeks ago at Pittsburgh and noted previously in THE IRON TRADE REVIEW.

New Export Concern

Application will be made Feb. 26 for a charter for the Jones & Laughlin Steel Products Co. to handle the export business of the Jones & Laughlin Steel Co. Officials of the latter say that the formation of the new concern means no radical departure from established policies, but it is designed to handle exports separately from the domestic trade.

Leading Interest Quotes Lead at 4c

The American Smelting & Refining Co., which, on Feb. 3, reduced the price of shipment lead, in 50-ton lots, from 4.25c to 4.10c, announced a further reduction on Feb. 5, to 4c. The outside market, in carload lots, is quoted at 4c, prompt shipment.

The Calumet Foundry Equipment Co., Chicago, has increased its capital stock from $1,000 to $300,000.

HELD REUNION

Republic "Old Guard" Guests of Messrs Wick and Thompson.

Executive and departmental heads in the pioneer days of the Republic Iron & Steel Co., as well as a number of iron and steel men from this district, gathered at the home of Col. George D. Wick, 656 Wick avenue, Youngstown, O., Saturday evening and enjoyed a banquet and reunion. The hosts were Colonel Wick, former vice president, and Alex. W. Thompson of Chicago, a former president of the Republic company.

The reunion was styled "a meeting of the old guard of the Republic." Reminiscences of the earlier days in the company's history were exchanged. Addresses were given by James A. Campbell, president of the Youngstown Sheet & Tube Co., former district manager of the Republic; by Attorney Harry Rubens, of Chicago, who attended to the legal end of the organization; chairman John A. Topping, of New York; David Thompson, of Cleveland, and Joseph G. Butler Jr.

John A. Topping spoke of the present conditions of the company and employed figures to denote its progress. He stated that only $7,000,000 had been spent in new construction until 1905 and that $14,000,000 have been spent for that work since that time. Resources in raw material had likewise been enlarged.

A large cake served at the banquet bore in gilded letters on its surface, the word "Republic," while on the upper surface, a blast furnace was reproduced in appropriate colors. The ice cream was brought out of concealment under miniature furnaces, covered with flaring red papers.

The authorized guest list given out by Colonel Wick follows: Randolph S. Warner, Columbus; S. G. Cooper, Pittsburgh; John A. Topping, New York; T. W. Guthrie, Cleveland; T. J. Bray, Youngstown; Samuel Thomas, Catasauqua, Pa.; George M. Bard, Chicago; William E. Taylor, Laporte, Ind.; John F. Taylor, Pasadena, Cal.; A. W. Houston, Chicago; William H. Hassinger, Birmingham, Ala.; George A. Baird, Monrovia, Cal.; E. N. Ohl, Pittsburgh; Charles Hart, Chester, Pa.; G. Watson French, Davenport, Ia.; James C. Corns, Massillon; William Barrett Ridgley, Y. B. Haagsman, New York; R. Jones Jr., Youngstown; S. J. Llewellyn, Harry Rubens, Chicago; George R. Sheldon, Grant B. Schley, New York; L. C. Hanna, Cleveland; Thomas Thatcher, New York; James A. Campbell, Harry Bonnell, Henry W. Heedy, H. R. Moore, J. W. Deetrick, C. T. Johnston, Youngstown; Floyd K. Smith, Sharon, Pa.; D. M. Forker, Cincinnati; James G. Caldwell, Louisville, Ky.; W. F. Bonnell, Cleveland; T. R. Akin, St. Louis; S. P. Kerr, Sharon; W. L. Simonton, John McLaughlin, Chicago; Harry L. Rownd, L. E. Cochran, William Manning, W. C. Reilly, Youngstown; Ralph P. Zint, Chicago; L. H. Jurey, C. M. Pierce, Peter Gordon, H. M. Hurd, Charles Thompson, Harry Parrock, Youngstown; F. B. Keiser, Birmingham; George L. Claypool, Pittsburgh; Stuart Henderson, Sharon; J. B. Martindale, New York; J. M. Butler, Joliet, Ill.; James Nutt, George Gerwig, George D. Wick, Joseph G. Butler Jr., Youngstown.

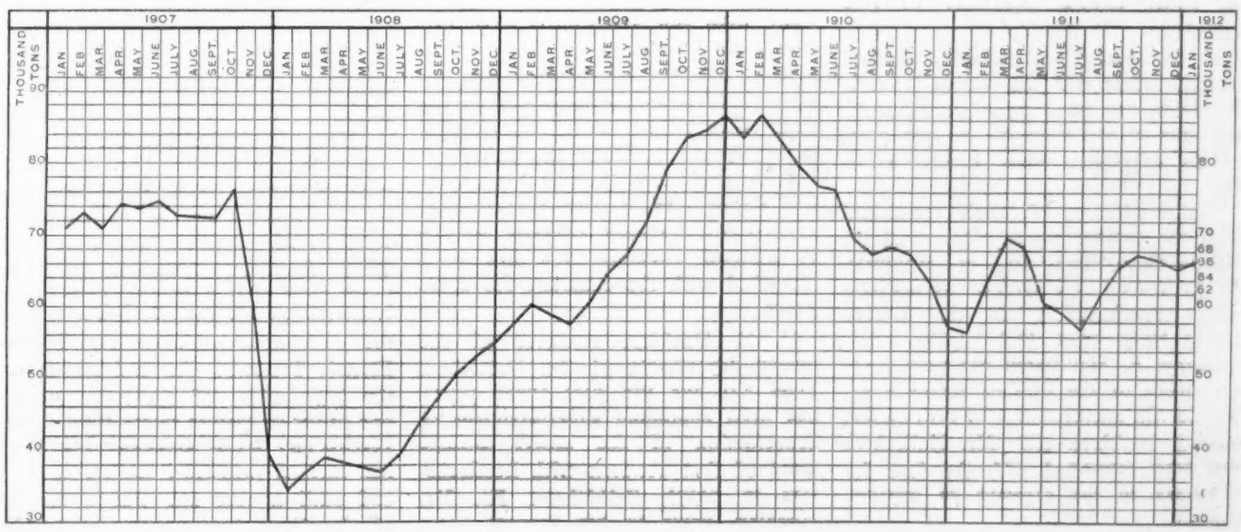
LARGEST ON RECORD

Were This Country's Iron and Steel Exports Last Year.

Last year's iron and steel exports were by far the largest on record. The tonnage exports amounted to 1,287,809 gross tons, a gain of 42 per cent over 1910, which had held the record. The total value of all iron and steel exports, including the tonnage lines, as well as machinery, hardware, cutlery, etc., but not agricultural implements or iron ore, reached a declared value of $249,656,411, a gain of 24 per cent over 1910, which had held the record.

In the nineties an export trade of importance started in the tonnage lines, but, except for some considerable exports of rails and wire products, this was confined almost entirely to unfinished materials, pig iron and sheet bars, billets, etc. Such exports reached a total of 1,154,284 gross tons, the largest tonnage exports under the old alignment. In 1903, when the exports amounted to only 326,590 tons, the United States Steel Corporation started a campaign to export the more finished products, such as plates and sheets, structural material, pipes and fittings, merchant bars, etc., and under this new movement the exports from 1904 to 1909 inclusive amounted to between 1,000,000 and 1,400,000 tons, with the exception of 1908, which showed a trifle under a million tons. In 1910 a new record was made, with 1,537,943 tons, and now this record has been broken by 42 per cent in 1911.

The Myers-Whaley Co., Knoxville, Tenn., manufacturer of tunneling apparatus, has increased its capital $100,000.



DAILY AVERAGE OUTPUT OF COKE AND ANTHRACITE PIG IRON

Personals

Howard W. Evans has been appointed general manager of sales by the Best Mfg. Co., Pittsburgh. Mr. Evans was formerly with Crane Co.

W. M. Carpenter, of Marion, Ind., has been appointed general manager of the Kuebler Foundries, Easton, Pa.

Wm. E. Corey, formerly president of the United States Steel Corporation, has been made a member of the board of directors of the Greene-Cananea Co.

The plant of the Kutztown Foundry & Machine Co., Kutztown, Pa., is overcrowded with work and is being operated day and night.

A. D. McAdam has been appointed Chicago representative of the Ralston Steel Car Co., Columbus, O. Mr. McAdam's office is at 720 Peoples Gas building, Chicago.

George W. Selby, who had been connected with the W. Bingham Hardware Co., Cleveland, for a number of years, has been appointed sales manager for the Cleveland Metal Paint Co.

F. V. McMullin, formerly with the United Engineering & Foundry Co. in the forging press department, has become treasurer of the Pennsylvania Forge Co., of Bridesburg, Pa.

S. T. Wellman, who sustained a fracture of a leg by a fall at Heroult, Cal., six weeks ago, has returned to his home in Cleveland and is now able to take a few steps with the help of crutches.

The Taylor Engineering Co., Allentown, Pa., has received the contract for furnishing the interior steel work of the 55-story Woolworth office building now under construction in New York City.

E. C. Felton, president of the Pennsylvania Steel Co., has sailed for Panama. He will visit and inspect his company's extensive iron ore holdings in Cuba before returning to this country.

F. A. Haughton, formerly general superintendent for the Taylor Iron & Steel Co., has taken a position as works manager of the Ilion, N. Y., gun plant of the Remington Arms & Ammunition Co.

Walter Knapp, formerly connected with the engineering department of the Niles-Bement-Pond Co., at Plainfield, N. J., has taken a position as assistant shop superintendent at the League Island Navy Yard, Philadelphia.

George E. Hallenbeck has been made a member of the firm of Baker Bros., Toledo, O., manufacturer of drilling and tapping machines, etc. Mr. Hallenbeck had been connected with the firm for 12 years in the capacity of superintendent.

At the annual meeting of the board of directors of the Scullin-Gallagher Iron & Steel Co., of St. Louis, held Jan. 29, the office of assistant to the president was abolished and S. S. Knight, who has held this position, was made vice president and general manager.

Richard Peters, who has been in charge of the Philadelphia sales office of the Pennsylvania Steel Co. and Maryland Steel Co. for the past 15 years, resigned from active service on Feb. 1. Robert W. Read succeeds him as sales agent on that date, in charge of the Philadelphia office.

Mahlow E. First, formerly with the Morgan Engineering Co., Worcester, Mass., and lately with the Pawling & Harnischfeger Co., Milwaukee, has been appointed mechanical engineer of the Indiana Harbor plant of the American Steel Foundries, succeeding B. H. Reddy, who resigned.

B. A. Brennan, recently contract manager of the Westinghouse Machine Co., and formerly with E. P. Allis Co., has been appointed sales manager of the power department of the Bethlehem Steel Co., in charge of gas engine and pumping engine sales. Mr. Brennan's headquarters are at South Bethlehem, Pa.

Wm. J. Coane has been elected third vice president and general sales manager of the Ajax Metal Co., Philadelphia. Mr. Coane enjoys a wide acquaintance in the foundry trade through his long connection with the Joseph Dixon Crucible Co. in the capacity of manager of the Philadelphia office.

Richard Peters Jr. has been appointed vice president and treasurer of the Birmingham Coal & Iron Co., Birmingham, Ala., to succeed James Bonnyman. He will retain his offices during arrangement of the details of consolidation of the Birmingham company with the Woodward Iron Co., previously noted.

H. E. Sheldon, president of the Allegheny Steel Co., who has filled the dual office of president and general manager, has resigned the latter office to give more time to his executive duties. W. Lester Walker succeeded Mr. Sheldon, effective Feb. 5, as general manager. He has been identified with the company for some years.

C. F. Hockley, engineer of the power department of the Bethlehem Steel Co. for the past three years, has been appointed superintendent of construction of the power department of that concern with headquarters in South Bethlehem, Pa. Mr. Hockley, prior to his present association, was identified with the Westinghouse Machine Co., East Pittsburgh, Pa.

William Sodemann, of St. Louis, has resigned as manager of the Edwardsville, Ill., plant of the United States Radiator Corporation, and has become identified with the Sodemann Heat & Power Co., St. Louis. A. J. Leischman, Corry, Pa., has been appointed as his successor. Mr. Leischman will take his office force along to Edwardsville, the present Edwardsville staff to be transferred to Detroit. Enlargements are planned for the Edwardsville plant under Mr. Leischman's supervision.

The Inland Steel Co. announces, effective Feb. 15, the appointment of O. P. Blake as assistant general manager of sales, with headquarters at St. Louis, in charge of southwestern territory. F. R. Meyer Jr. has been appointed district sales manager at St. Louis and J. B. Sharp district sales manager at Kansas City. The Inland Steel Co., recognizing the importance of Kansas City as a market for its products, will open an office there, Feb. 15, in room 511, R. A. Long building.

Obituaries

Rudolph Herr, a veteran foundryman, died at Catasauqua, Pa., at the age of 56 years.

Philip J. Metzger, manager of the American Foundry Co., of Toledo, O., died Jan. 20. Death was caused by cancer of the liver.

J. Howard Mitchell, aged 79, one of the founders of the Wm. Butcher Steel Works, now known as the Midvale Steel Works, Philadelphia, died Feb. 6, at Hatboro, Pa. He was a member of the firm of Philip S. Justice & Co., dealers in railway supplies.

Hon. Benjamin F. Pearson, of Halifax, N. S., who had been seriously ill for two months with kidney disease, died Jan. 31, aged 56 years. He was proprietor of the *Halifax Chronicle* and prominent in political life, but was more widely known as an enthusiastic industrial promoter. In 1893, he organized the Dominion Coal Co. in association with H. M. Whitney, of Boston, and other American capitalists, and six years later took a leading part in the formation of the Dominion Iron & Steel Co. He also promoted the Halifax Electric Tramway Co., and assisted in the organization of numerous traction and power companies in the West Indies, Mexico and South America. Mr. Pearson entered provincial politics in 1901, and until a year ago was a member of the Nova Scotia government. He was a native of Colchester, N. S.

The Manufacture of Malleable Iron Stove Plate

A Discussion of the Methods Pursued in the Production of These Light Castings in a Wisconsin Foundry

The Malleable Iron Range Co., Beaver Dam, Wis., operates a large and completely equipped plant, devoted exclusively to the production of malleable ranges. The works consist of malleable and gray iron foundries and buildings and equipment for assembling the ranges. The malleable foundry is one of the most interesting features of the plant, since the problems that confront it are unusual and have been solved in an original manner, and from the further fact that the Malleable Iron Range Co. is said to be the only manufacturer of malleable ranges owning and operating a malleable foundry for the exclusive production of stove castings.

The difficulties in economically operating such a shop can be appreciated. The castings are light in weight; the percentage of sprues and loss has always been very high; a great many molds must be made daily, involving the handling of a large number of flasks and many cubic feet of sand; the floor space required is large and the necessary equipment is expensive; many men must be employed, and for all this outlay in plant, materials and labor the tonnage of good castings produced has been relatively small and the cost correspondingly high. Most stove manufacturers have sought to escape from this dilemma by buying their malleable castings from some plant making a specialty of jobbing work. But this method of solving the problem also has its disadvantages. The stove manufacturer has no direct control over the quality of the castings and there is at times trouble with deliveries due to freight congestion or other causes that cannot be prevented. Also, the foundry is such an intimate part of any stove plant, that it is to the manufacturer's advantage to have it directly under his control in all departments.

Malleable Foundry Difficulties

After some years' experience in buying its malleable castings from outside shops, the Malleable Iron Range Co. concluded that the best interests of its business demanded that it build and operate a malleable foundry of its own. The difficulties in the way of this policy have been surmounted by operating the malleable shop in close union with the gray iron foundry, using the same gang of laborers for both, thus materially reducing the labor cost per ton in each department and particularly in the malleable foundry. Also, a special study of the details of molding and casting has been made in the malleable foundry with the aim of reducing to a minimum the losses due to bad castings and the waste metal involved in sprues and gates. Up to the present time these losses have been reduced from 25 per cent, which is considered good practice in some shops making malleable stove plate, to less than 10 per cent and it is expected that the loss will eventually be brought down to 5 per cent or less. A great many patterns have been remounted so as to cut down the waste in sprues and gates; many castings which, heretofore, were made with two sprues are now poured with one, reducing the weight of waste metal from 30 to 50 per cent.

The foundry building is L-shaped, as shown in Fig. 10, the gray iron shop occupying one branch and the malleable department the other. The axes of the two branches meet at an acute angle to conform to the property lines. The gray iron shop is 155 feet long and 70 feet wide; the malleable foundry is 190 feet long and 70 feet wide, exclusive of the annealing room, which is 60 x 90 feet. The mill room, located between the annealing room and main foundry, is 90 feet long and 15 feet wide.

The building is steel frame con-

FIG. 1—A GENERAL VIEW OF THE MALLEABLE FOUNDRY, SHOWING THE AIR FURNACE IN THE CENTER

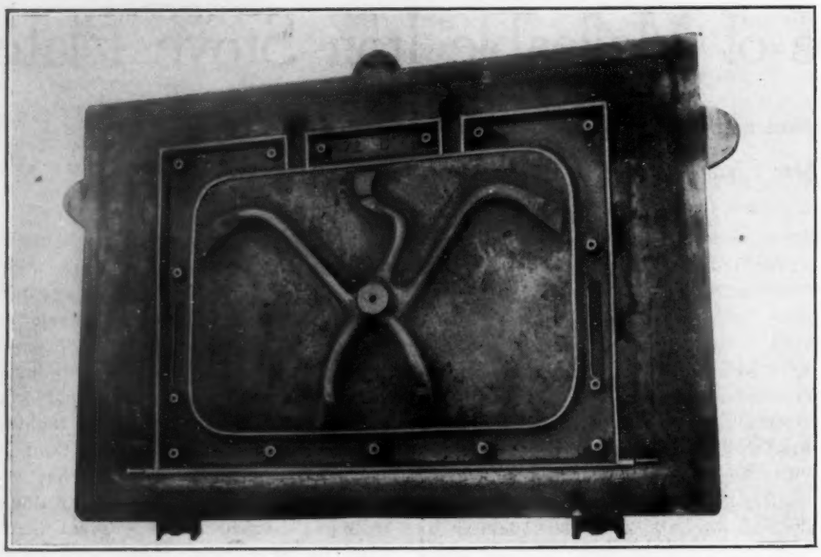


FIG. 2—COPE SIDE OF OVEN DOOR MATCH-PLATE, SHOWING THE S-GATE

struction with brick walls stiffened by pilasters. The monitor, in addition to the usual ventilating windows, is supplied with a row of inclined sash 5 feet wide, which greatly improves the light in the building. Four 12-inch ventilators are fitted to each monitor. The roof consists of 2-inch plank laid on the upper chords of the trusses and is covered with a roofing material. Artificial illumination is supplied by a row of 250-watt tungsten units spaced 60 feet apart down the center aisle of each shop, supplemented by incandescent lamps at the sides over the molding machines and wherever necessary. Each shop is heated by parallel pipe coils suspended from the roof trusses, as shown in Fig. 1. Exhaust steam circulates through the coils, but in severe weather live steam is used if necessary. In the malleable shop there are eight coils, six having 417 square feet of radiation surface each and two 365 square feet, making the total radiation 3,232 square feet. In the gray iron foundry there are 2,607 square feet of radiation divided into seven coils. The buildings are equipped with automatic sprinklers throughout.

Melting Malleable Iron

Metal is melted in the malleable foundry by a 10-ton, coal-fired air furnace, Fig. 6, built by the Whiting Foundry Equipment Co., Harvey, Ill. The furnace is standard in construction, but attention should be directed to the extra heavy cast iron plates and brackets which serve as binding on the sides and end, the end plates being ribbed. The gases from the furnace, before passing up the stack, are

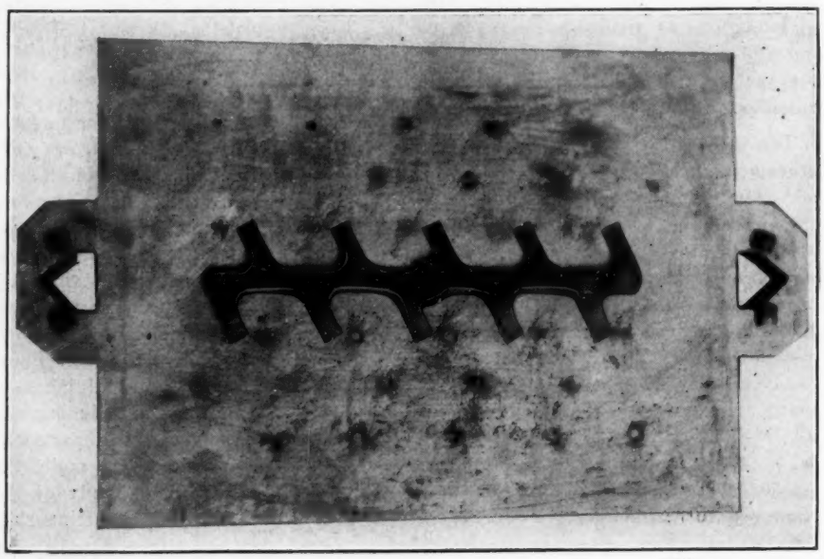


FIG. 4.—COPE SIDE OF MATCH-PLATE, SHOWING METHOD OF GATING SMALL CASTINGS

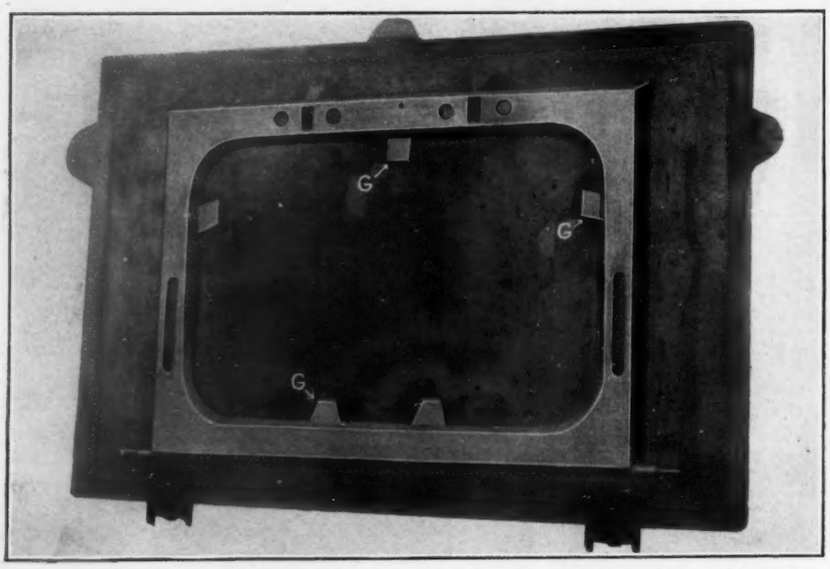


FIG. 3—DRAG SIDE OF OVEN DOOR MATCH-PLATE, SHOWING THE CONSTRICTED GATES AT *G*

led through a 300-horsepower Wickes vertical waste heat boiler, which supplies sufficient steam to take care of the power requirements of the entire plant. The use of this boiler saves at least five tons of coal per day. The furnace practice is standard. The silica sand for the bottom is obtained from Portage, Wis., a few miles from Beaver Dam. A new bottom is made every week and every two weeks the side walls are repaired. No southern pig iron is used, it being more economical to melt northern iron, most of which comes from the Mayville furnaces of the Northwestern Iron Co., which are situated only 25 miles from Beaver Dam. While the air furnace is nominally rated at 10 tons, the heats vary from 6 to 14 tons, according to requirements. The fuel ratio is about 42 per cent and it

requires five hours to melt down a normal heat and three hours and 20 minutes to handle a 6½-ton heat. In the table on the following page is given a mixture used for a typical heat of 6½ tons.

The net area of the molding floor in the malleable shop is 8,400 square feet, thus giving 420 square feet of floor space per ton of output daily, assuming two daily heats of 10 tons each. A large portion of the molding is done on Arcade vibrator machines and Arcade squeezers, there being 37 of the former and 12 of the latter in the shop. These machines are arranged along the walls, as indicated in Figs. 1 and 8. Some of the heavier work is done on the floor, using hinged match plates, although as fast as possible arrangements are being made to handle all of the work on the

FIG. 6—THE 10-TON AIR FURNACE

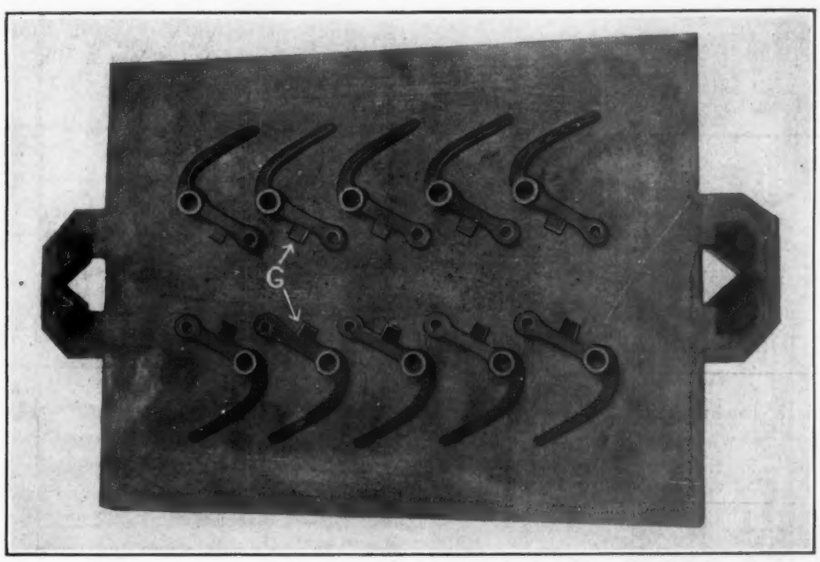


FIG. 5—DAMPER ARM PATTERNS ON DRAG SIDE OF ALUMINUM MATCH-PLATE; THE GATES ARE SHOWN AT *G*

machines. About 60 molders are employed.

Fig. 9 shows one of the molds which are now made on the floor. This is a collar top, being that portion of the stove provided with an elliptical collar on which the pipe is fitted. Two of these castings are molded in each flask. As shown in the illustration, there are only two sprues, whereas before the patterns were remounted there were four. The flasks are 18 x 36 inches and one man puts up about 40 molds per day. The flask and match-plate hinges are a modification of the Bucks hinge. The principal features of this improved hinge are shown in Figs. 3 and 9. It will be noted that whereas the Bucks hinge is rigid in one direction only and has to be fitted individually to each flask, this hinge is rigid in both directions and absolutely prevents the cope and drag from getting out of register. The hinge works on the knife edge principle, which is so successfully employed in fine instrument making, where accurate motions are necessary.

It will be noted from Fig. 9 that the flasks have wooden sides and cast iron ends, with handles cast with the ends. Attention is directed also to the tongue, *T*, on the match-plate. This is known as the rapping tongue, it being the only portion of the plate which is exposed when the flask is closed.

Stove lids are molded on a machine, two lids in each flask. In order to insure the lids being smooth and not injured by dirt carried into the mold by the flowing metal, the mold is slicked with plumbago under the gate

FIG. 7—A VIEW OF THE GRINDING ROOM

FIG. 8—A FLOOR READY FOR POURING, SHOWING LARGE MOLDS WITH ONE GATE

impressions where the errosion is greatest. One man with a machine puts up 160 of these molds in a day.

Figs. 2, 3, 4 and 5 show both sides of two of the special aluminum match-plates, which are used very extensively in this shop. The plate shown in Figs. 2 and 3 contains an oven door pattern and that illustrated in Figs. 4 and 5 contains several patterns of damper regulating arms. These plates have a number of features of special interest.

Oven Door Match-Plate

The oven door match-plate, Fig. 2, shows clearly a type of gate known as the S-gate, which has been developed in this shop in order to avoid breaking the sprues while hot and to insure clean castings and reduce the number of runners. It is customary in malleable foundries casting stove plate to break the sprues from the casting while the metal is still red hot. If the sprues are not broken off until the castings cool, considerable loss results on account of the brittle nature of the metal before it is annealed. The S-gate does away with all hot breaks, thereby avoiding heavy losses. It will be noted that the gates are confined almost entirely in the cope, only the very ends of the gate prints appearing on the drag side of the plate, Fig. 3, on which the pattern is mounted. The metal, therefore, in flowing through the gates moves constantly on a down grade and is not so inclined to tear out the sand, since it flows by gravity as much as by the pressure due to the molten metal in the runner. It will be noted that the gate is greatly restricted at the point where it enters the mold. This neck or orifice is made as small as possible and just back of the orifice the gate is greatly enlarged. When this gate cools the resulting contraction breaks it from the casting, or if the strain produced in cooling is not sufficient to accomplish this, the gate is easily broken off by a light blow from a hammer after the casting has cooled and there is no danger of injuring it. Fig. 5 shows a card of small patterns on a match-plate.

Mixture for a Typical 6½-ton Heat of Malleable Iron.

Weight, pounds.	Material.	Analysis—Silicon, per cent.	Sulphur, per cent.	Phosphorus, per cent.	Manganese, per cent.
2,200	Pig iron	1.50	0.020	0.160	0.51
510	Pig iron	1.69	0.031	0.180	0.56
1,100	Charcoal pig	1.66	0.015	0.150	0.61
915	Charcoal pig	1.51	0.018	0.145	0.48
2,100	Pig iron	1.03	0.024	0.182	0.57
400	Annealed-scrap	0.98	0.070	0.167	0.31
400	Steel rails	0.30	.....	.....	0.70
5,600	Sprues and gates	0.98	0.061	0.167	0.31

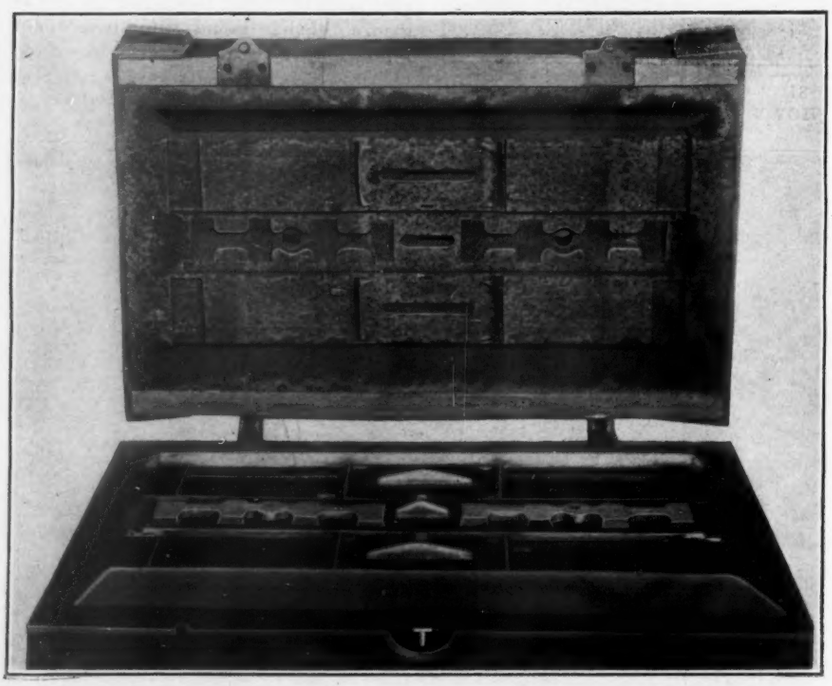


FIG. 9—COLLAR TOP MOLD, SHOWING METHOD OF GATING

Match-Plate Mixture

The match-plates are cast aluminum of the following composition: Six parts aluminum, one part zinc and one-half part bismuth. The aluminum and zinc are melted together first and the bismuth is added to the molten mixture. The plates are cast in skin dried molds. The patterns, gate prints, etc., are made from a pattern brass of the following composition: Seventeen pounds of copper, one pound of tin, five pounds of sheet copper scrap and one-half ounce of bismuth. The patterns, etc., are mounted on the plates by machine screws with counter-sunk heads, the screw-heads being filled with solder.

Two heats are generally poured each day and laborers are employed to shake-out the flasks and clean-up the floors and gangways. The molders cut over their own sand with the assistance of a laborer if necessary.

The same gang of laborers for the malleable shop is also employed in the gray iron foundry. When the malleable shop was built a 24-inch industrial track extended through the center, connecting the molding floor with the cleaning room and the finished castings were carried to the cleaning room in trucks running on this track. It was found, however, that considerable loss was suffered through the breakage of light castings handled in quantities by this method and the track was removed. At the present time the castings are conveyed to the cleaning and annealing room a few at a time in wheelbarrows and although the labor cost is undoubtedly higher than it was when the track was in service, the gain due to the reduction in breakages more than balances the increased expenses, resulting in a net saving.

Most of the molds have only a thin wall of sand and to avoid runouts from snap-flask work, the molds are jacketed while they are poured. Only about a half dozen jackets and weights are used on each floor, a laborer being employed to shift them while the molder is pouring.

As shown in Fig. 10, the cleaning room is located between the molding room and annealing room. There are 10 mills, five for cleaning hot castings and five for handling annealed work. They are all driven through shafts and belts by a 20-horsepower, 220-volt, 3-phase, 60-cycle motor. Five of the mills, which are 26 inches in diameter and 60 inches long, are used for cleaning annealed castings, and three of the same size clean the hard castings. In addition, the small hard castings are tumbled in two square 8-foot x 24-inch mills.

Annealing Ovens

There are four annealing ovens arranged in a row and fired with coal at the rear. These ovens were furnished by the Whiting Foundry Equipment Co., Harvey, Ill., and are each 18 feet long, 12 feet wide and 9 feet high, with a capacity of 32 pots each. The standard pots are 24 x 30 inches, 13 inches deep, cast in one piece 1 inch thick. Malleable iron pots are used and have been found much more durable than ordinary gray iron pots, lasting from 20 to 30 heats. The castings are packed in mill scale and are annealed about 72 hours. Occasionally, coke siftings are used with the mill scale. The pots are designed so that the castings will fit snugly in order to get the maximum tonnage in each heat. A 30-foot span, 4-ton Whiting traveling crane extends in front of the ovens and is used for handling doors, pots, etc. After the castings are annealed and cleaned they are taken to the factory building on the industrial railway, where they are first straightened under heavy drop hammers and later polished and ground.

Gray Iron Foundry

The gray iron foundry presents no unusual features. It is equipped with a Whiting cupola, 36 inches in diameter inside of lining, located as indicated in Fig. 10. Only light work is produced, so no traveling or jib cranes are employed. The 24-inch industrial railway which connects the various departments of the plant and the yard extends down the center of the gray iron shop for conveniently handling materials. The castings are machine-molded, using match-plates similar to those described for the malleable work. Facing sand, consisting of one pound of bolted sea coal mixed with ten to twelve pounds of molding sand, is used for molds for light ornamental castings.

The core room is situated in the corner at the junction of the gray iron and malleable shops, as shown in Fig. 10. Very few dry sand cores are used and they are all light and simple in character. The core room is equipped with a Whiting shelf oven.

Both shops are provided with compressed air. The steam is generated in a waste heat boiler connected with the air furnace. The engines and generators are located adjacent to the range factory some distance from the foundry. The engine room equipment includes a 225-horsepower, Fitchburg engine connected to the machinery in the factory, through a system of rope drives and a 240-volt, 48-ampere, 3-phase direct-connected unit, recently installed. An Ingersoll-Rand air compressor is also included in the equipment.

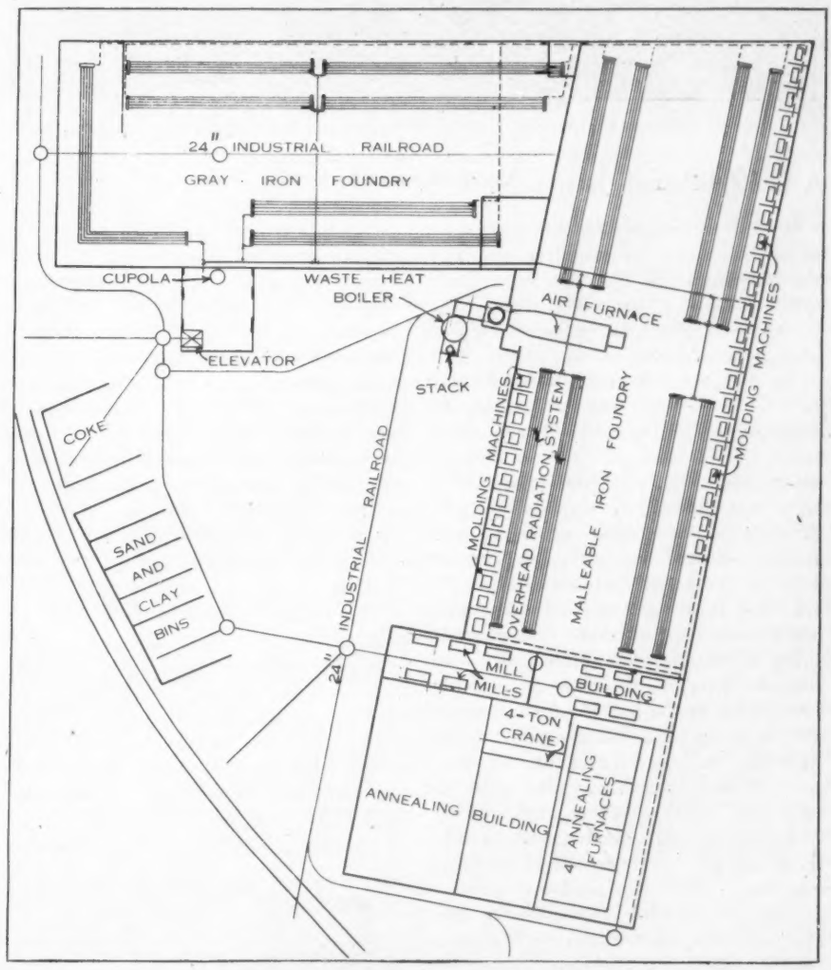
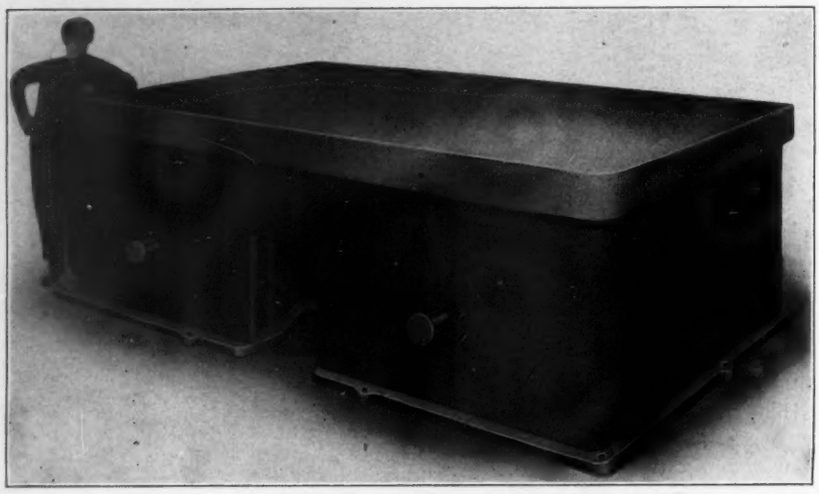


FIG. 10—GENERAL LAYOUT OF THE MALLEABLE IRON RANGE CO.'S GRAY IRON AND MALLEABLE FOUNDRY

The officers of the Malleable Iron Range Co. are as follows: A. G. Hill, president; Fred W. Rogers, vice president, and Silas McClure, secretary.



JAR-RAMMING MOLDING MACHINE OF 120,000 POUNDS LIFTING CAPACITY

A 120,000-Pound Jarring Machine

In the accompanying illustration is shown a large jar-ramming molding machine built by the Herman Pneumatic Machine Co., Zelienople, Pa., which was recently installed in the gray iron foundry of the Mesta Machine Co., Pittsburgh. The table plate is 8 x 12 feet and the base is of corresponding dimensions. The cylinder is 40 inches in diameter and has a lifting capacity of 120,000 pounds. The base is made of cast iron and the table is cast steel. An automatic self-control valve of the latest Herman type is employed. It consists of a top and bottom head, double check valve stem and differential piston and body. All operating parts are inside of the body and the only openings consist of the inlet, the opening into the cylinder and the exhaust to the atmosphere. The seats of the valve are so arranged that they may be reground easily.

The valve is constructed to consume only a sufficient amount of air required to lift the load and produce the proper number of blows per minute necessary for ramming the mold. The valve is placed directly against the port of the cylinder, thereby insuring the greatest efficiency.

The table plate is provided with eight long guides lubricated through four pockets which are packed with waste and oil. The guides are provided with wearing plates of the same dimensions, which are adjustable and are concealed in the base. The table is a one-piece steel casting properly ribbed to reduce the weight without affecting the strength of the table. The plunger is a one-piece cast steel section which is bolted to the table plate and is provided with expanding packing rings. The table plate falls on 30 resilient jarring surfaces, equally distributed around the top of the base. The aggregate area of these surfaces is 590 square inches. Both cope and drag halves of molds have been successfully rammed on this machine and the molds have been poured at distances of less than 20 feet from the machine while it was in operation. This indicates that, notwithstanding the size and power of the machine, practically no vibration is imparted to the surrounding floor, the shock being absorbed by the resilient surfaces in the base. A duplicate of this machine will be built in the near future for use in the steel foundry operated by the Mesta Machine Co.

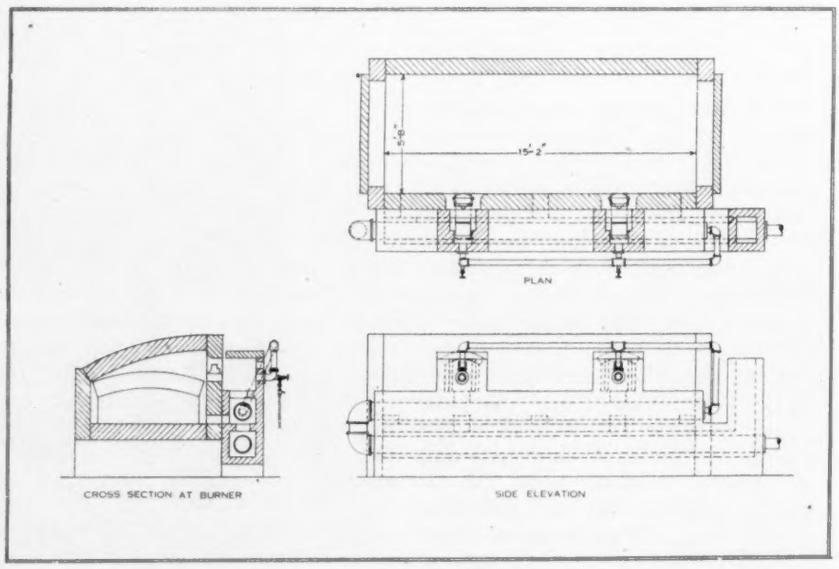
The Plymouth Foundry & Machine Co., of Plymouth, Wis., has increased the number of its directors from three to five.

A Furnace for Annealing Steel Cast'ngs

An oil-burning annealing furnace embodying a number of interesting features of design has been installed recently at the Indiana Harbor, Ind., works of the American Steel Foundries. The furnace is used for annealing manganese steel castings and was designed by F. S. Richmond, consulting engineer, Fisher building, Chicago, under the F. J. Nice patents. Its principal features are shown in the accompanying illustration. The new furnace was rebuilt from an old one of the same dimensions, 5 feet, 8 inches wide and 15 feet, 2 inches long inside, with an effective area of 45.3 square feet, for castings, but as rebuilt now has an area of 86 square feet. This increase in capacity has been accomplished by removing the old bridge wall and making the entire hearth of the furnace effective.

As now designed, the furnace is charged with about six tons of castings, varying in weight from one to 200 pounds, all of which are raised to a temperature of 1,825 degrees Fahr., soaked for two hours and then quenched in water. The castings are piled on racks and are charged through the end doors, the two burners being placed in one of the side walls.

In operation there is no flame in the furnace chamber to strike the castings or to produce hot spots on the walls, the flame being diverted by the wedge-shaped blocks placed directly in front of the burners. No excess air is admitted above that required for complete combustion at the temperature desired. There is,



PLAN, SIDE ELEVATION AND CROSS-SECTION OF FURNACE FOR ANNEALING MANGANESE STEEL CASTINGS

therefore, no smoke in the furnace and the surplus gases pass out through the vent shown on the drawing, but before being allowed to escape they are used to preheat the air delivered to the burners. The oil is delivered to the burners at a pressure of 15 pounds per square inch and at a temperature of 100 degrees Fahr. The air is delivered at a pressure of 20 ounces and at a temperature of 400 degrees.

Oil-Burning System

The atomized oil, being ignited in the combustion chambers, strikes the combustion blocks, which break up the flames, and complete combustion takes place before the gases enter the furnace. The hot gases are spread out fan-shaped when leaving the combustion blocks, insuring a wide distribution in the furnace. The pressure from the burner forces the gases along the arch to the side walls and ends, and thence down to and across the hearth to the take-up flues shown in the walls below the burners. This flow is aided by the injector action of the burners, which draw the gases from the air heating chambers through the up-takes, which connect these chambers with the combustion chambers. Therefore, a regenerative effect is obtained by causing part of the heated and spent gases to circulate through the furnace a second time. The excess gases which are not used in this manner enter the air heating chambers, pass around the air drums therein and then escape through the vent.

In a test of this furnace, temperature readings were taken at various points over the hearth by a Bristol indicating pyrometer and also by a Brown radiation pyrometer, at points on the side and end walls. These readings all coincided within the limit of error of the instruments, which was 10 degrees. The blast was furnished by a Connersville blower, delivering 550 cubic feet of air per minute at 1½ pounds pressure. A rotary pump is used for circulating the oil and it is provided with a relief valve which acts when the burners are shut-off. The oil is strained and heated by a steam coil. During the test the furnace was operated on cold air with the thermometer at zero degrees Fahr.

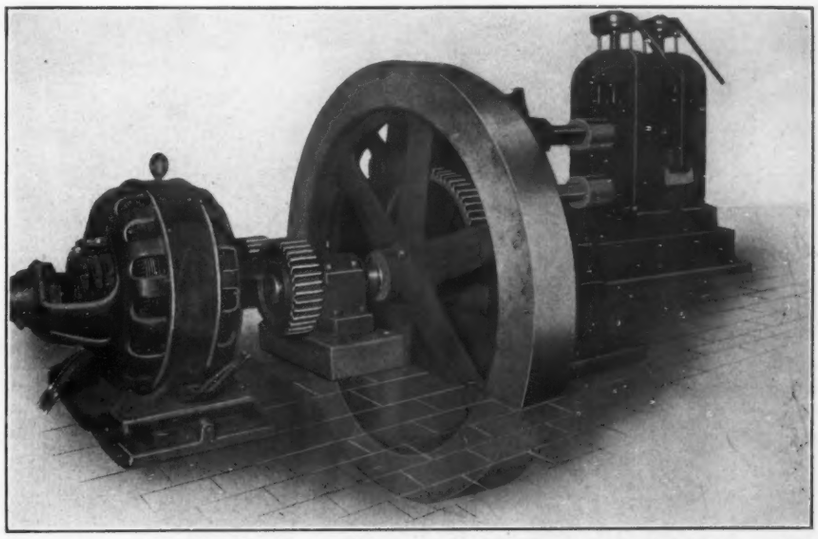


FIG. 2—DRIVE END OF ROLLING MILL, SHOWING THE MOTOR AND BALANCE WHEEL

A New Cold Rolling Mill

A new mill for cold rolling sheet metal is now being built by the Standard Machinery Co., Providence, R. I. Fig. 1 is a view of the mill, which shows the roll stands, pinions, herringbone train gears, balance wheel and at the extreme left, the 60-horsepower motor. Fig. 2 is another view of the mill, showing the motor, gear, pinion and balance wheel. The net weight of the equipment, including the rails, balance wheel and motor is 29,000 pounds. The top and bottom rolls, Fig. 1, are 11 inches in diameter with 12-inch face. The runout table, which is tangent to the bottom roll on either side of the housings, is fitted with bronze wedges, each of which has a finger clip so that it can be removed easily and will guide the steel sheet without wrinkling or binding it. Heavy adjusting screws are used, and a positive drive is provided from the three-high herringbone train to the top and bottom rolls. The boxes of the middle roll are cast iron, lined with bronze, and bronze thrust washers are attached to each end, which are adjusted laterally by set screws. The washers and wabbler connections are cast steel. The herringbone pinions are likewise made of cast steel and have adjustable boxes. The main driving gear is attached to the central herringbone, being shrouded in cast steel and the pinion, which meshes with it, is likewise shrouded with cast steel. The intermediate train of gears are made of cut steel. The balance wheel is 8 feet in diameter and weighs 4,000 pounds.

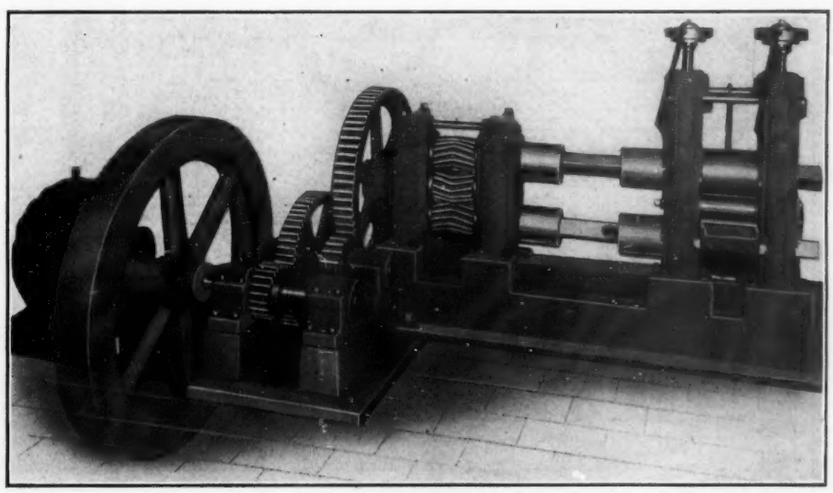
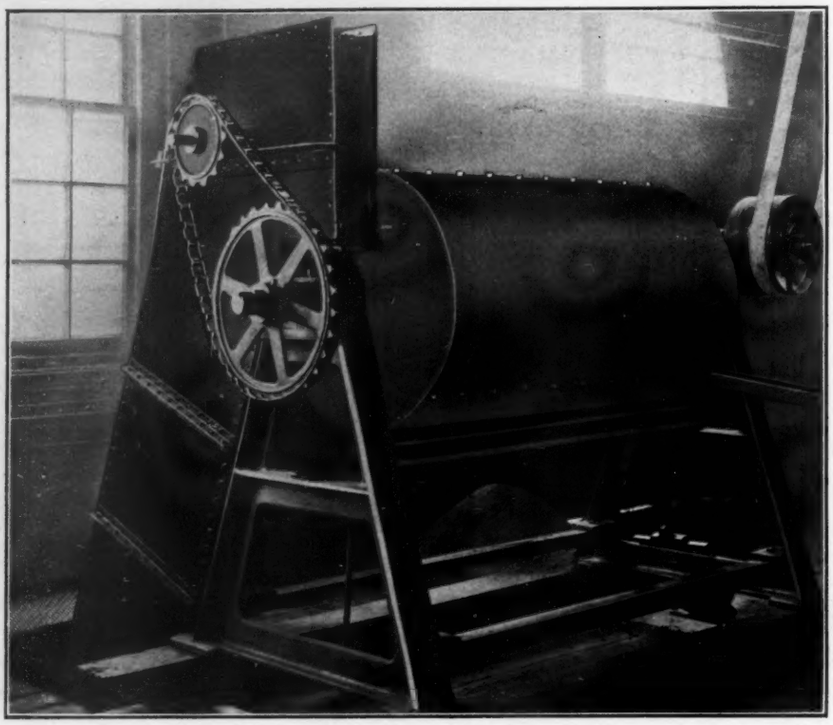


FIG. 1—FRONT VIEW OF NEW ROLLING MILL BUILT BY THE STANDARD MACHINERY CO.

The mill is direct-driven by a 60-horsepower motor, operating at a speed of 860 revolutions per minute. The mill is so designed that the 11-inch rolls can be removed through the opening in the end and 14-inch rolls can be placed in position for special work. The middle roll is made of hardened and ground, mirror-lapped tool steel and both the 11-inch and 14-inch rolls are of the shell type, forced over arbors, the shell being made of hardened and ground tool steel. The mill is so designed that it can be set upon a concrete foundation with the balance or driving wheel operating in a pit. The motor pinion is made of bronze and meshes with the



THE OSBORN CORE SAND WASHER

motor gear, which is made of cut steel. The mill is anchored to the foundation by 2-inch bolts with foundation plates 40 inches below.

Some of the dimensions of the mill follow: Driving gear, pitch diameter, 48 inches; teeth of driving gear, 72; face of driving gear, 5 inches; pitch diameter of intermediate gear, 32 inches; pitch of intermediate gear, 2 inches; teeth on intermediate gear, 64 inches; pitch diameter of herringbone gear, 16 inches; gear ratio of mill complete, 1 to 14.545; gear ratio of mill exclusive of motor, 1 to 11.636; speed of rolls, 59 revolutions per minute; length of rails, 9 feet; height of mill from bottom of rail to top of roll housing, 63 inches; maximum height, 8 feet; length over all, 18 feet, and width over both rails, 44 inches.

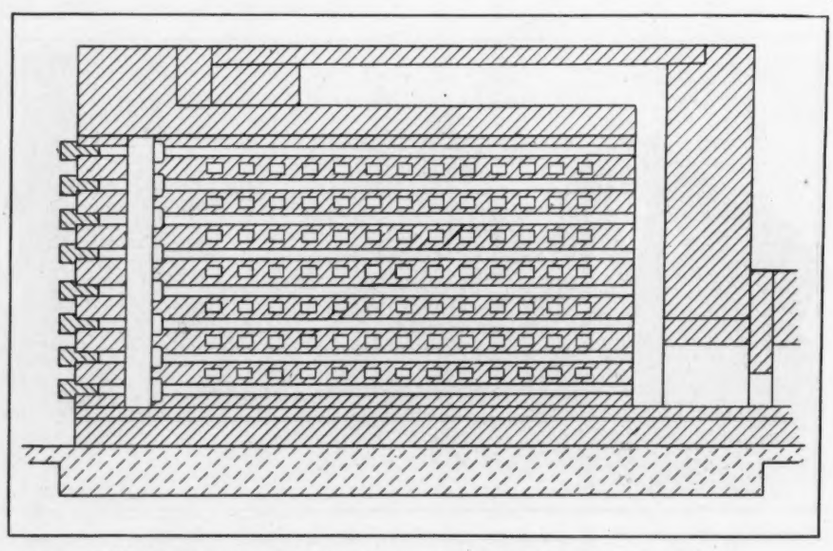
Osborn Core Sand Washer

An improved type of core sand washer, equipped with a bucket conveyor, is now being built by the Osborn Mfg. Co., Cleveland. The capacity of the machine shown in the accompanying illustration varies from 20 to 24 cubic yards in 10 hours, whereas the washer formerly built had a capacity of only from 12 to 16 yards in a 10-hour period. Ten gallons of water are used for each cubic yard of sand washed. The sand is automatically conveyed from a pit at the side of the washer by a bucket conveyor. The sand from the cleaning room is dumped into this pit adjacent to the boot of the conveyor. The washer is equipped with two discharge spouts, the one delivering practically 90 per cent of the reclaimed sand and only 10 per cent of this sand is carried into the settling basin by the other spout. The sand is discharged into wheelbarrows at the front end of the machine for delivery to the core room. A conveyor system also can be arranged to deliver this sand to the core shop in plants where a large amount of sand is used. The drum of the washer is mounted on two V-shaped legs, reinforced with steel angles. It is belt-driven and by the method of gearing adopted the use of a countershaft has been eliminated. Hand feed washers also are built for shops not desiring the automatic conveyor feed.

It has been estimated that this core sand washer will effect a saving of $34.37 daily on a basis of reclaiming 20 cubic yards of sand. The machine can be operated by one laborer.

A New Type of Regenerator

In ordinary types of furnaces, the products of combustion escape at high temperatures, and from 30 to 50 per cent of the available heat energy of the fuel is lost. Leo. Kentnowski, discussing this subject in the *Iron and Coal Trades Review*, states that this loss of energy is reduced by utilizing the heat of the burned gases to preheat the air required to promote combustion. This practice constitutes what is known as the regenerative process. The usual design of regenerators has some disadvantages which practically limits their application to steel works furnaces. An important modification of regenerator construction has been made by a Swedish engineer. The regenerator consists of a large number of tubular bricks, arranged to form transverse and longitudinal flues. The waste gases pass through the longitudinal flues and their heat is absorbed by the brick work. The transverse flues are arranged alternately with the longitudinal flues and are used for the passage of the blast, which absorbs the heat imparted to the brick work by the heated gases. The currents of air and gas thus pass through the regenerator in layers, at right angles to each other. The outer wall of the regenerator is built of bricks similar to those employed inside, and each longitudinal flue has an external opening provided with a stopper, which can be removed, permitting the flue to be examined and cleaned, even when the furnace is in operation.



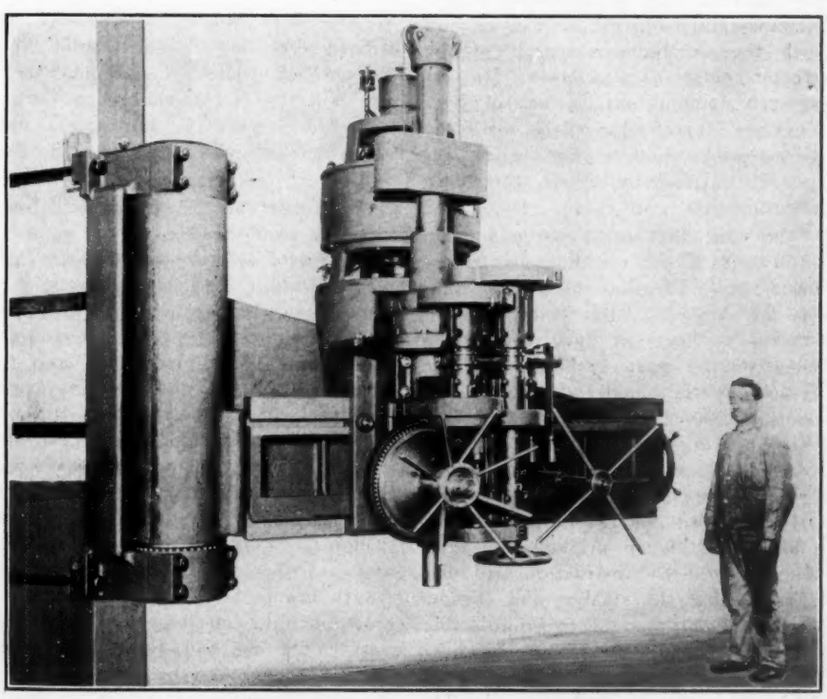
LONGITUDINAL SECTION OF NEW TYPE OF REGENERATOR

In the accompanying illustration is shown a longitudinal section of the regenerator.

The chief advantage of this system is the small space required by the regenerators, which makes them more generally applicable to metallurgical operations. Tests made on several furnaces equipped with these regenerators showed high efficiency and great economy. One furnace of this design was erected at the works of Arthur Krupp, Berndorf, Austria, and was used for annealing brass, German silver, nickel and copper in the form of bars and sheets. When charcoal, possessing a heat energy of 4,300 calories, was used as fuel, 190 tons of these metals were annealed in 39 hours, the consumption of charcoal having been 12 tons. Other experiments conducted with coal showed a fuel consumption of 4 per cent of the weight of the material annealed. In a furnace for the manufacture of illuminating gas, the height of the regenerator was 4 feet, and its heating surface, 58 square feet for each retort. With this furnace, the proportion of coal used for heating, varied from 11.5 to 13.5 per cent.

Radial Drill Driven by a Vertical Motor

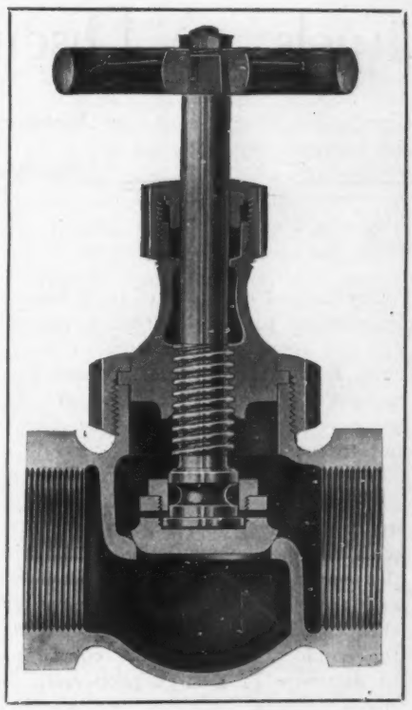
The application of a vertical shaft motor to a heavy duty radial drill is shown in the accompanying illustration. The machine is of the "Dreadnought" type built by the Detrick & Harvey Machine Co. It has a capacity for drilling 25 inches a minute in steel with a 1⅛-inch drill and drills from 1 to 3 inches in diameter may likewise be used. The spindle is driven by a Westinghouse 220-volt, 10-horsepower vertical motor. In place of being mounted at the base and driving the spindle through several sets of bevel gears, this motor is mounted on the radial arm and is connected to the spindle by a single reduction spur gear. This arrangement insures practically the full output of the motor to the spindle and the friction loss is reduced to a minimum. Actual tests show that with a reliable motor of the vertical type the horsepower required is reduced to almost one-half of that required by the usual practice of using a horizontal motor at a distance with an elaborate set of gearing.



RADIAL DRILL DRIVEN BY A VERTICAL MOTOR

N. T. C. Regrinding Valve

A sectional view of a regrinding valve manufactured by the National Tube Co., Pittsburgh, is shown in the accompanying illustration. The valve can be reground without removing it from the line and without the use of a regrinding machine. When regrinding, the union bonnet ring is disconnected and the trimmings are removed, leaving the body of the valve in the line. A small amount of oil and emery dust are placed on the seat. In sizes larger than ½ inch, the disc and stem are drilled, a small piece of wire or nail being inserted through this hole to prevent the disc from turning with the stem. Sizes ½ inch and smaller have the disc cast solid with the stem and this procedure, therefore, is unnecessary. The trimmings are replaced in the body of the valve, the union bonnet ring given one or two turns and a new seat can be ground in quickly. The regrinding valve has a convex seat and disc which practically prevent the possibility of foreign matter lodging between the disc and the seat at the point of contact.



SECTIONAL VIEW OF REGRINDING VALVE

The bonnet of the valve is short and compact, but is of sufficient size to give the desired lift. The stem, which is partially encased in the bonnet, is of sufficient length to do more than the required amount of work and ample room is provided for repacking the valve. The hubs of the valve are made extra heavy to resist misuse in screwing in a pipe. The seat is cast solid with the body and has no inserted parts which will become loose as a result of the expansion and contraction of high pressure steam lines. These valves are tested twice before shipment, once with 400 pounds cold water pressure above the seat and the other test is with 400 pounds cold water pressure below the seat. These tests are in addition to a similar hydraulic test of the bodies made in the foundry to determine the soundness of the castings. This type of valve is made in all standard sizes in both the globe and angle pattern, as well as horizontal check and angle check pattern from ¼ to 3 inches.

A test to ascertain the durability of the valve was recently made by the National Tube Co. and one of these valves was opened and closed 327,094 times before it began to leak. It was then reground and again was put into use. At the present time this valve is giving satisfactory service under 125 pounds air pressure.

Fuels---A Discussion of Their Uses and Abuses[1]

Attention is Directed to the Necessity of Conserving the Country's Fuel Resources and the Use of Waste Materials

By R P Bolton

The subject of fuel is of fundamental importance to the heating engineer, and the economic utilization of available materials constitutes a most important part of the service of our profession, not only to our own clients but to the community.

The use of fuel in the northern portions of our country is of vital importance, not merely to our industries, but to human existence during the occurrence of low temperatures, and any increase in its cost, or any shrinkage in its supply, directly affects the comfort, and even the conditions of existence of a large proportion of the population.

A general advance has taken place during 1911 in the price of anthracite coal, upon the use of which fuel New York City is largely dependent, an advance probably to be followed by another increase during the current year. These advances are indications of the gradual approach of the period of exhaustion of the supply of this desirable and advantageous form of combustible material, and point to the not distant time when the city of New York will be confronted with the dreaded infliction of a general dependence upon bituminous coal.

The advance of modern improvements will no doubt gradually bring about better conditions in the combustion of soft coal so far as to reduce the nuisance of visible smoke, but it remains a fact that present extravagance in the use of fuel in the eastern part of the country is not only helping to bring about the elimination of anthracite as a fuel, but, as in other parts, contributing unnecessarily to the eventual exhaustion of the accessible coal measures of all kinds in the east, a result which may eventually bring about the transfer to the west of our future industries, and perhaps of the larger part of the population of the country. These considerations indicate the desirability of serious reflection upon the need for the study of economic methods, and for the dissemination of information bearing upon the evils, present and future, of modern extravagance and recklessness in the use of the invaluable commodity with which nature has, to a not unlimited extent, provided us.

Many of those to whom this subject is presented are apt to discount the urgency of the situation and its possible disadvantages to our successors, by reference to the availability of other materials for the production of heat. That other materials capable of utilization as fuels exist, and to a considerable extent, is true. Yet their use is not unaccompanied by waste of another kind, since their value for other purposes is greater than for that of mere combustion, and it is only when they take the form of a true waste product, incapable by reason of local or fixed conditions of more economic utilization, that they can be considered as proper substitutes for coal.

It is due to our effective, if perhaps indefinite appreciation of this fact, that coal is so widely applied to the exclusion of other apparently accessible sources of heat. The process is carried too far in some cases, as in that of the neglect to utilize the waste materials of cities.

Coal is, itself, a more or less misplaced material. Its existence does not entirely coincide with the desirable location of great industries and with the developed situation of the greater centers of population. Its cost to such communities as that of New York, is, therefore, largely made up of artificial additions due to its removal and distribution to the place of utilization.

The fuel, for which we pay from $2.50 to $6.50 per ton, has cost at the place of production barely a third of the amount. But such circumstances of location and carriage, in view of the vast developments and economies in modern methods of transportation, cannot be debited with the whole responsibility for the fact that coal has within the past half century increased in cost.

It has been due to some better application of known principles of draft and of furnace construction and proportion, that the smaller and cheaper grades of anthracite become utilizable, whereby advantageous use has been made in recent years of the rejected waste of earlier mining methods. The culm banks have, however, been diligently exploited and the product is no longer a waste material. The combustion of other cheap material may soon be forced upon our industries and power developments, by the shortage of the finer grades of fuel, which will be in necessarily higher demand as scarcity develops. Every indication thus points toward the desirability of advance consideration of the subject so vitally affecting our general welfare.

The alternative sources of present and future fuel for this part of the country probably lie in vast peat and lignite deposits of the east and south. But the use of some lower grades of fuel will require reconsideration of existing practices, rearrangement of appliances and reconstruction of much of the fixed apparatus now in use.

Further developments of the gas engine will contribute more directly to the effective utilization of such materials since it has been demonstrated that lignite, the heat value of which is not more than 75 per cent that of coal, may be made to afford equivalent power by means of the gas producer.

These and other materials may be utilized ere long in substitution for the cheaper grades of coal, but such use will be accompanied by large costs of necessary appliances and some increasing complexities of operation.

The observant heating engineer, traveling over this country, is naturally impressed by the opportunities for the utilization of local materials for combustion, and sometimes observes incongruous conditions accompanying the apparently unnecessary use of coal. In the wooded districts, vast quantities of unused lumber rot on the ground, and along rivers and on the sea coast driftwood and wreckage litter the shores. Such materials are little utilized, though driftwood is sold in New York City at $6 a barrel, and small oak and hickory cut to length brings $16 to $19 a cord.

In portions of the country where peat could be had for the cutting, coal is brought to be burned, and I recently saw the waste of a wood-

[1]Presidential address delivered at the annual meeting of the American Society of Heating and Ventilating Engineers.

working factory being dumped into a fill, in a mill using bituminous coal at $3.50 per ton.

Natural gas has been obtained at so low a price as 30 cents per 1,000 cubic feet even as far away from its source of supply as Buffalo, yet soft coal is being consumed and ineffectively, with much accompaniment of smoke in that vicinity.

The wastage of one industry or process may be capable of supplying the fuel of a lesser, if properly applied, but it is not to be forgotten that waste materials are possibly capable of utilization in better form than combustion.

In the northwest, millions of tons of straw and cornstalks are burned locally, and in the south vast quantities of cotton shells and fiber, capable of use either in the production of food materials or paper.

Neglect of one large opportunity is taking place in this and in many other cities, due to their failure to utilize the waste materials of the community, which are disposed of by common expense instead of being made the means of effective heat production. Under proper furnace arrangements, the rejected ashes, which contain a considerable percentage of unburned carbon, combined with the waste wood and paper, can be utilized effectively with the garbage of a city, to contribute more than the cost of the collection, in providing power for other purposes. The waste materials of a city the size of Havana would, under proper conditions, afford power for all municipal water pumping and sewage disposal.

The waste materials of the borough of Manhattan, with a population of approximately 2,300,000 persons, is annually:

	Cubic Yards.
Of light, inflammable refuse	2,100,000
Of ashes	3,000,000
Of garbage	220,000

The ashes contain approximately 20 per cent of unconsumed carbon, representing a heating value equivalent to 168,000 tons of coal, the annual value of which is $504,000; to this may be added the cost of disposition at 45 cents per yard, $270,000, making a total of $774,000 per annum.

This large proportion of wasted fuel is due to the negligent methods of operation of domestic fires, to inefficient settings and proportions of boilers and furnaces, and to ineffective drafts for complete combustion.

With all the accumulated information of past experience and with all the improvements of the present day, the economics of combustion of fuel are not widely understood, and are little practiced. We find today comparatively few steam-generating boilers properly set, and many unprovided with proper draft for the fuel which is used. With a multitude of inventions and devices for so-called smoke-prevention, the simple principles of furnace construction, of proportion of grate to rate of combustion, of proportion of air supply and the advantages of high furnace temperatures, are neither understood by or taught to the man who handles the destruction of this valuable material, from the use of which are derived most of our comforts, our industries and our transportation.

Better Understanding of Facts

A special obligation lies upon our society, as representing engineers engaged in the art of heating, to impress upon the public, and in particular, upon the users of fuel, a better understanding of these fundamental facts and principles. An immense amount of printed matter has been devoted to the description of appliances connected with the distribution of heat, but much less has been done to educate the consumer in the economic utilization of the heat in the fuel for which he pays.

The waste and carelessness exhibited in this direction and the ignorance of the class of men employed in the combustion of fuel are factors which have hastened the development of central heat, light and power services.

It is inevitable that as time proceeds and the supply of conveniently available fuel becomes scarcer, accelerated by the volume of demand, increased by reckless wastages, the community will depend almost exclusively upon centralized and economically-operated centers of heat, of light and of power production. It is natural that the course of economic developments should take this direction.

The economies in which it is difficult at present to interest the consumer of fuel become of commanding importance to a great industrial center of heat and power production. We have only to compare an average small steam engine and boiler in the isolated plant, using up coal at a rate of 10 pounds for the production of a kilowatt-hour, with the latest addition to the electrical generating plant in the Waterside station of the New York Edison Co., giving the same unit of force, for a destruction of less than 15 per cent of that amount of fuel.

But while this process is in course of development, it is none the less necessary to impress upon the public mind the fact that the main source of artificial heat lies in the coal supply of our own country and that this is not an unlimited amount. Beyond its exhaustion lies the use of materials of limited value and also of limited amount, or a dependence upon developments of mechanical or chemical methods, involving expense and uncertainty such as we should reject, and perhaps resent, if offered or required as a substitute for the simple service of coal. Let us remember that for every ton of coal taken out, about an equal amount is necessarily abandoned in the mine; and that a large amount of available lumber is also destroyed or abandoned in the same process of extraction. Every year's working of the coal measures increases the difficulties of coal winning, and adds to its cost.

The best available information at this date limits the accessible supplies of coal, at our present progressive rate of consumption, to 100 years, and the precedent conditions thereby brought about may be experienced by the children of some of us here present. The time must inevitably come when legislation will restrict the right of the individual to waste fuel, in any direct and eventually even in any indirect manner, and we may well imagine that the work of the heating engineer will at that time become of prime importance to the welfare of the nation.

There is a fine element in the production of coal which should make a special appeal for recognition of the evils of its unnecessary waste. The cost of coal is not paid in money alone, but in an inevitable price of human life and of injury to our fellow creatures. The terrible percentage of the loss of life to the tonnage raised, which obtained in the past, has been ameliorated only in the mere proportion which the number bears to the increasing tonnage raised, and not in the aggregate. It remains a fact that about 2,000 lives are sacrificed each year in the production of the 550,000,000 tons of coal which we partly use and which we partly waste; and that 5,000 persons, most of them hard-working men having others dependent upon their labor, are maimed and injured.

Coal is really a common possession, a heritage of the past to our present times, a priceless gift of ages of slow accumulation, which is disappearing not only by mere necessary usage, but also in great part by reckless and ignorant misuse. It should be thought a high crime against the com-

munity to contribute to the injury and deprivation of our children whose welfare is bound up in the provision which nature has made for our own and for their benefit.

Surely, considerations such as these should specially impress every heating engineer and point to the duty that lies upon us, of aiding in every way the elimination of preventable and useless waste and the utilization of every opportunity for economy in the material which constitutes the main support of our industries, one of the main sources of the country's wealth and the best means of maintaining the habitable character of much of the most desirable part of this country.

Spelter in 1911

The annual preliminary statement issued by the United States geological survey shows that the zinc industry, in so far as production and consumption of spelter are concerned, enjoyed a year of continued normal growth. The total production of spelter for 1911 broke all records; the production from domestic sources alone exceeded the total production for any previous year in the history of the industry and exceeded the domestic production for any other year by more than 21,000 tons. Coupled with this increase in production there was a decrease of six-sevenths in imports and at the same time the phenomenally high exports of 1910 were increased by one-third.

The following figures have been compiled by C. E. Siebenthal, of the geological survey, from reports furnished by all operating smelters of zinc ores, showing their output for the first 11 months of the year and their estimated production for December. Figures showing the imports and exports for 11 months were obtained from the bureau of statistics and to these figures estimates for December have been added.

The production of spelter from domestic ore in 1911 is estimated at 273,807 short tons, and from foreign ore at 14,237 tons, a total of 288,044 tons, worth, at the average price, $33,837,000, as compared to a total of 269,184 tons in 1910, made up of 252,479 tons of domestic origin and 16,705 tons of foreign origin. The production of spelter from both domestic and foreign ores, apportioned according to the states in which smelted, was approximately as follows: Illinois, 84,626 tons in 1911, as compared to 73,038 tons in 1910; Kansas, 97,790 tons in 1911, as compared to 105,697 tons in 1910; Oklahoma, 46,061 tons in 1911, as compared to 34,760 tons in 1910; all other states, 59,587 tons in 1911, as compared to 55,689 tons in 1910.

Imports of zinc ore fell off about 5 per cent. They were approximately 82,639 short tons, containing about 33,333 tons of zinc, as compared with 87,406 tons imported in 1910. The figures for 1911 are exclusive of 21,016 short tons of lead ore from South America, containing 2,887 tons of zinc, an average of a little more than 12 per cent, all of which was lost in smelting the lead and thus does not properly enter into the figures of imports of zinc. Of the zinc ore imported, 77,900 tons, nearly 95 per cent, came from Mexico, as compared with 82,657 tons imported from Mexico in 1910. The exports of domestic zinc ore for the first 11 months of 1911 were 18,286 short tons, valued at $642,884, as compared with 19,711 tons in 1910.

Imports of spelter decreased six-sevenths, being estimated at 285 short tons, valued at $132,750, as compared with 1,960 tons in 1910. This is exclusive of 1,028 tons of zinc dust, worth $103,387, imported during the first half of the year. Exports of domestic spelter increased over 50 per cent, being estimated at 5,292 short tons, worth $618,344, compared with 3,390 tons in 1910. During the first nine months of the year there were also exported under drawback articles manufactured from 2,628 tons of foreign zinc on which duty had been paid. The exports of zinc dross amounted to 4,193 short tons, valued at $343,729, as compared with 4,724 tons in 1910.

The apparent domestic consumption of spelter in 1911 may be computed as follows: The stock on hand at smelters at the beginning of the year, 23,232 tons, plus the imports, 285 tons, and the production, 288,044 tons, gives the total available supply of 311,561 tons. From this there are to be subtracted the exports of domestic spelter, 5,292 tons, the exports of foreign spelter, 10,678 tons, the exports under drawback, 2,628 tons, and the stock on hand at smelters at the close of the year (to be exact, on hand Dec. 15), 9,025 tons, a total of 27,623 tons, leaving a balance of 283,938 tons as the apparent domestic consumption. This calculation takes no account of the stocks of spelter held by dealers or consumers. On comparing the consumption in 1911 with the 245,884 tons consumed in 1910, the 270,730 tons in 1909, the 214,167 tons in 1908, and the 226,969 tons in 1907, it is to be noted that the apparent consumption is abnormally large, indicating that stocks other than those at smelters have appreciated.

Difficult Concrete Shaft Sinking

The North American Iron Mining Co., which is operating properties on the Mesabi Range, has accomplished a feat in shaft sinking work that is said to be unique in the Lake Superior district. A concrete shaft was put down on the company's property, Section 4, Town 61, Range 15, in St. Louis county, to a depth of 94 feet, by the Foundation Co., of New York. Four feet of gravel lay between the bottom of the shaft and the solid ledge. Into this stratum were injected by means of a pump, 16 carloads of liquid cement. This made a solid concrete wall on all sides. The new concrete work was just like the other portion of the shaft, except that it did not contain the steel reinforcement.

After passing through the stratum, the work was continued down about 50 feet in the usual manner, with timbers 12 x 12 inches in size, laid up to the bottom of the concrete, making a concrete shaft reaching to a depth of 138 feet below the surface. The depth of the shaft has now reached 160 feet. The excavations and extensions have been made through the solid rock, a distance of 22 feet more.

The work at the North American Co.'s shaft has attracted much attention among the mining men in the Mesabi district, and many of them have examined it. It was predicted by many, when the work was started, that the company would not be successful in sealing the bottom of the concrete shaft. It is now said that the shaft is one of the dryest on the range, in spite of its being in a wet territory.

According to a recent vice-consular report the exports of tin from the Federated Malay States during the first nine months of 1911 were 7,206 tons, an increase of 280 tons over the corresponding period of 1910. The exports of tin ore during the same period were 25,205 tons, a decrease of 831 tons compared with the first nine months of 1910. The total value of the tin exports was $28,951,263, against $23,753,005 in 1910.

The H. W. Johns-Manville Co., New York City, announces the removal of its Louisville office from the Lincoln Savings Bank building to the Paul Jones building. The office is in charge of J. R. Chowning.

The Minnesota Steel Co.'s New Plant at Duluth

Some Features of Construction With the General Arrangement of the Roll Stands in the Rail and Merchant Mills

The general features of the new plant which the Minnesota Steel Co., a subsidiary of the United States Steel Corporation, is building at Duluth, Minn., were published in THE IRON TRADE REVIEW, March 16, 1911, page 543. Preliminary studies have since been made of the roll layouts and approximate position of the machinery in the blooming mill, rail mill and merchant mills at this plant. The proposed arrangements are indicated in Fig. 2, and although many details remain to be worked out, the main features have been definitely decided. As shown in Fig. 2, some novel features of design are contemplated; the blooming mill, rail mill and merchant mills are connected together in one compact group which, it is expected, will result in considerable operating economies. The soaking pits, blooming mill and rail mill are laid out in tandem and the main axis of the merchant mills is parallel thereto. A system of rotary transfers will be employed to shift the blooms from the blooming mill runout table to the reheating furnaces and from thence to the merchant mills.

Soaking Pits

The soaking pits and ingot stripper are so located that they are conveniently accessible from the open-hearth furnaces. Four pit furnaces will be installed, each containing four holes with a capacity of four ingots. The total soaking pit capacity is, therefore, 64 ingots with an aggregate weight of 320 tons. Gas for combustion in the pit furnaces will be supplied by four continuous, mechanically-poked producers, situated in a row opposite the furnaces. The hot ingots from the open-hearth department enter at the northwest corner of the plant on the tracks shown in Fig. 2. The pit furnace building and the stripper form virtually one structure, 400 feet long and 80 feet wide. The former will be equipped with a 10-ton charging crane and the latter with a 100-ton stripping crane. The details of this arrangement are somewhat similar to those at the new plant of the American Rolling Mill Co., Middletown, O., described in THE IRON TRADE REVIEW, Aug. 31, 1911.

Table *A*, Fig. 2, which forms the approach table to the blooming mill, will be extended in front of the soaking pits in such a manner that the ingots can be placed on it by the charging crane. A 40-inch, two-high reversing blooming mill will be installed just south of the soaking pits, as shown in Fig. 2, and will be used to break-down the ingots into blooms of convenient size for further rolling in the rail and merchant mills. The preliminary plans provide a two-cylinder, high-pressure, direct-connected, reversing engine for driving this mill, the engine cylinders being approximately 55 x 60 inches. The mill will be extra heavy and equipped

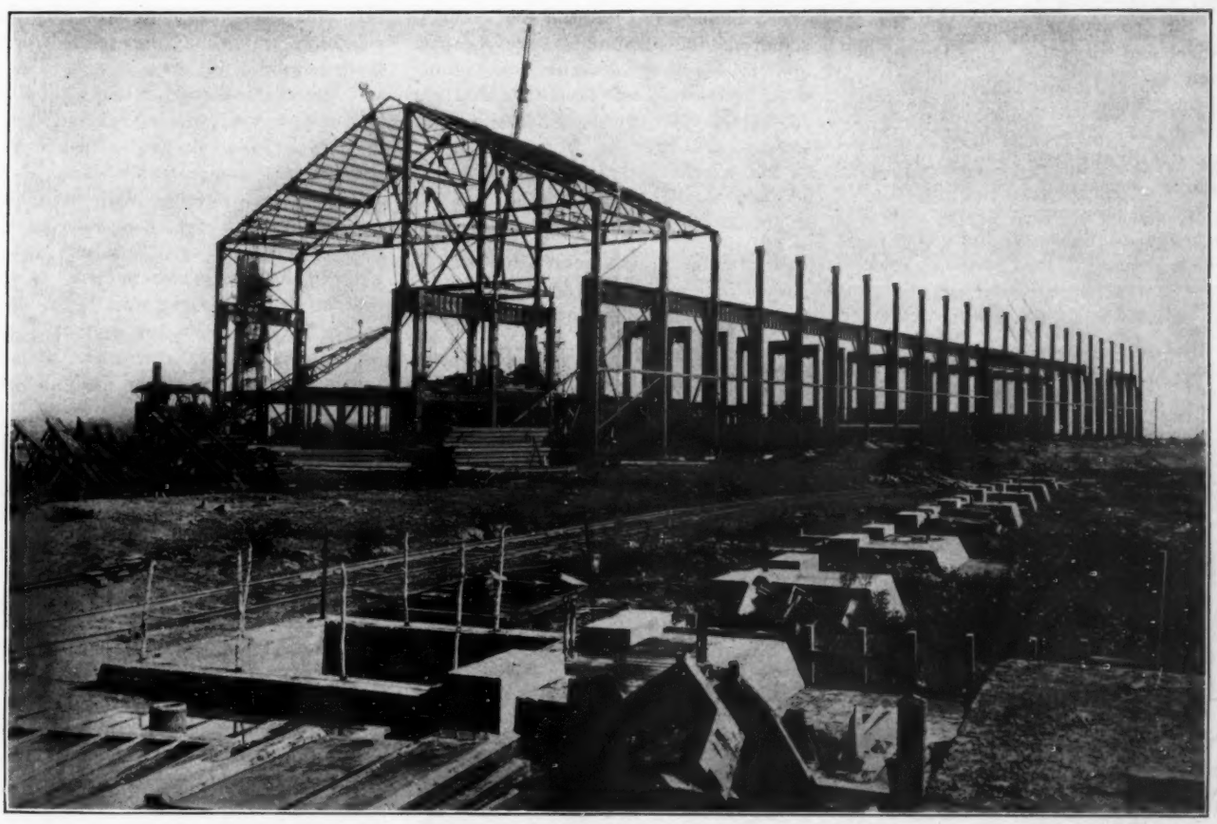


FIG. 1—OPEN-HEARTH BUILDING IN COURSE OF CONSTRUCTION, SHOWING THE SOAKING PIT BUILDING FOUNDATIONS IN THE FOREGROUND

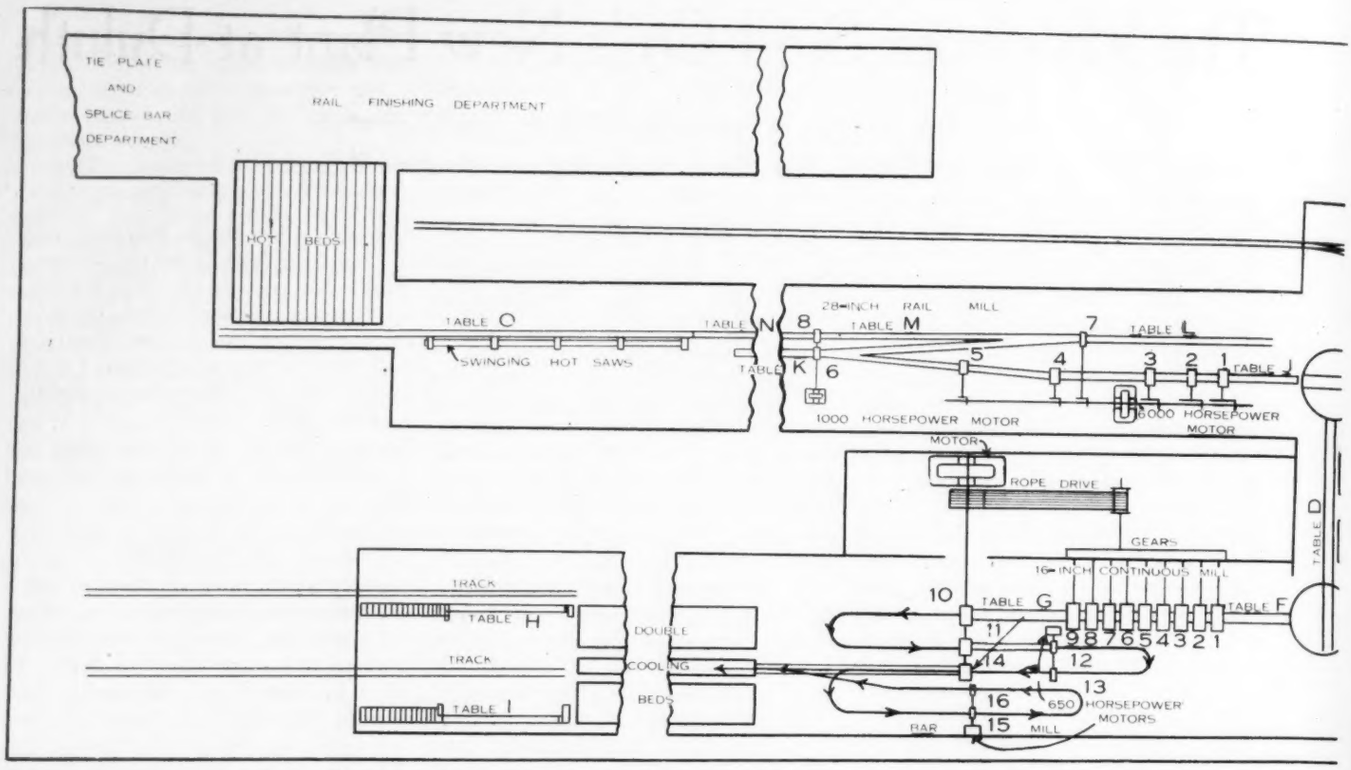


FIG. 2—SKETCH PLAN OF BLOOMING MILL, RAIL MILL AND MERCHANT MILLS OF THE MINNESOTA

with suitable manipulators and other auxiliary devices.

Leaving the 40-inch mill, the blooms will be conveyed by table *B*, Fig. 2, to the rotary transfers situated at either end of table *C*. Those destined for the merchant mill and requiring further heating, will be transferred onto table *E*, and from thence into one of the two 18-foot continuous heating furnaces. The furnaces will be of the regenerative type and are arranged to discharge onto table *D*, which conveys the blooms over a rotary transfer to table *F*, forming the approach to the continuous merchant mill. Such blooms as do not require reheating can be handled direct over table *D*, and the arrangement is also such that reheated blooms can be delivered to the rail mill if required. The layout is very compact and is carefully designed to handle the blooms to best advantage and get the most out of the reheating furnaces.

Merchant Mill

The general arrangement of the roll stands in the merchant mill is shown in Fig. 2. The first nine stands form a continuous 16-inch roughing train. Stands 10, 11 and 12 are 12-inch finishing mills, stands 13 and 14 are 10-inch and stands 15 and 16 are 8-inch. The roll stands are so laid out that the piece, after leaving the roughing train, may be sent directly through stand 14 for a finishing pass and proceed thence to the cooling bed, or having passed through the first 14 stands, the two final 8-inch passes may be omitted. Stands 1 to 11, inclusive, together with stand 14, are driven by a single motor situated as indicated in Fig. 2. Stands 10, 11 and 14 are direct-connected to the motor shaft, but in order to have some flexibility in the operation of the roughing train, a rope drive is interposed between the motor and the mill. The various stands in the roughing train are driven through suitable gearing. The remaining features of the mill, which is designed to roll round and square bars and small shapes, are shown in Fig. 2.

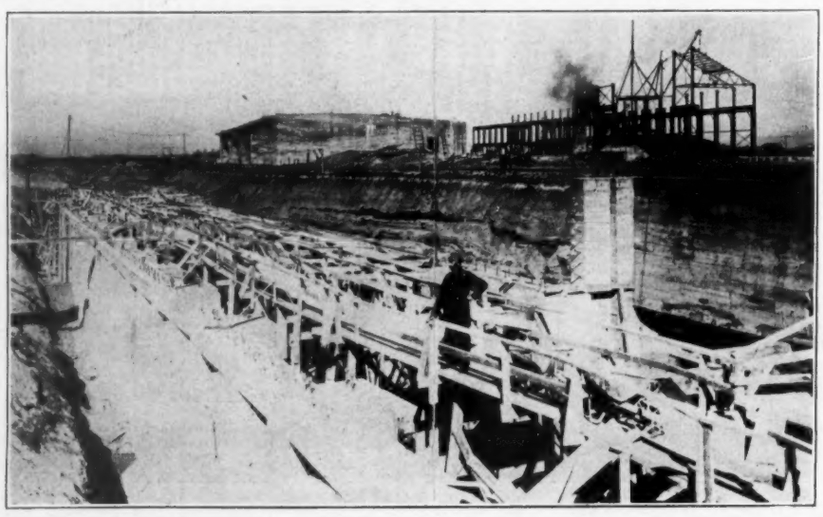
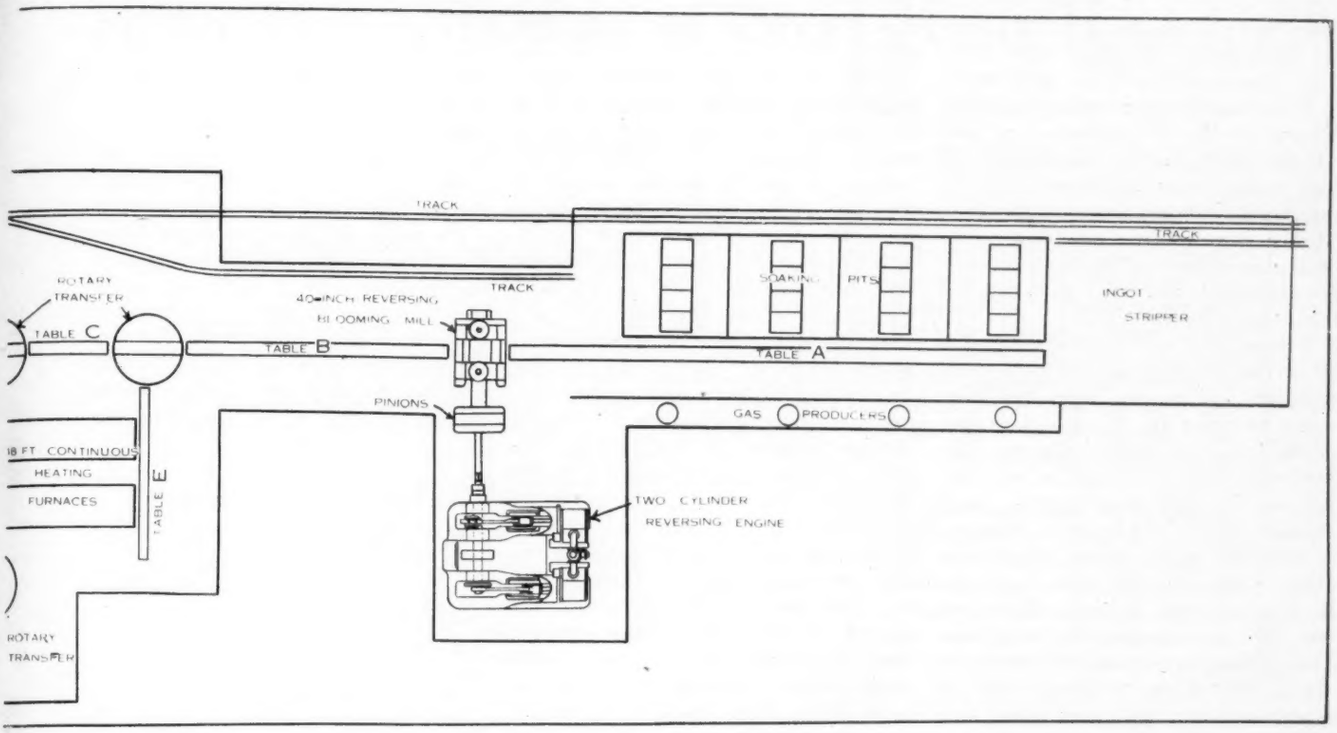


FIG. 3—CONCRETE FOUNDATIONS FOR ORE BINS, WITH BLAST FURNACE FOUNDATIONS AND OPEN-HEARTH BUILDING IN THE BACKGROUND

The 28-inch rail mill consists of eight stands of rolls, six two-high and two three-high, laid out in tandem, as shown in Fig. 2. Stands 1 to 5 inclusive, and also stand 7 will be driven from a single motor, probably 6,000 horsepower, through bevel gearing and the sixth and eighth stands will be direct-connected to a single motor, probably 1,000 horsepower. The motors will be designed to operate on 6,600-volt, 25-cycle, three-phase current. The layout of



STEEL CO., DULUTH, SHOWING THE PROPOSED LAYOUT OF THE ROLL STANDS, TABLES, MOTORS, ETC.

the mill and the arrangement of the roll stands will be somewhat similar to the 18-inch merchant mill at the Gary plant of the United States Steel Corporation. After receiving the finishing pass in the eighth stand of rolls, the rail will be conveyed over table *L* to a set of swinging hot saws and from thence to the hot beds. The swinging hot saws will probably be similar to those in the Gary rail mill, that is, they will be 42 inches in diameter, driven by a single 40-horsepower, 2,000-volt, alternating current motor, and will operate at about 1,400 revolutions per minute. The saws are brought down to the rail by crank and pitman arrangements, all five saws being geared to the same shaft, thus making their movement simultaneous.

Power for driving the mills and also for blowing will be supplied by gas engines having a total capacity of approximately 10,000 kilowatts. There will be four blowing engines driven by coke oven gas and they will have a capacity of 40,000 cubic feet of free air per minute. The pumping station will have a capacity of 30,000,000 gallons daily.

Blast Furnaces

The two blast furnaces will have a daily capacity of 450 tons each and will be 125 feet in height by 26 feet in diameter. Each furnace will be equipped with five stoves, the extra one being supplied on account of the severe winter climate. The distance between the centers of the two furnaces is 360 feet. A complete system of ore, coke and limestone bins will be constructed in front of the furnaces, laid out somewhat similar to the installation at Gary. Concrete foundations for these bins have been completed, as have the furnace foundations, and are shown in Fig. 3.

The fuel from the plant will be brought from Pennsylvania coal fields in the vessels of the Pittsburgh Steamship Co., and the coke will be made at the plant. A battery of 92 Koppers by-product coke ovens will be erected for this purpose. The blast furnaces will be equipped with a pig casting machine for taking care of the surplus product.

At the present time, seven open-hearth furnaces of 70 tons capacity each are being erected, but space has been provided for the construction of seven additional furnaces on the east end of the present building. The furnaces are arranged in the usual

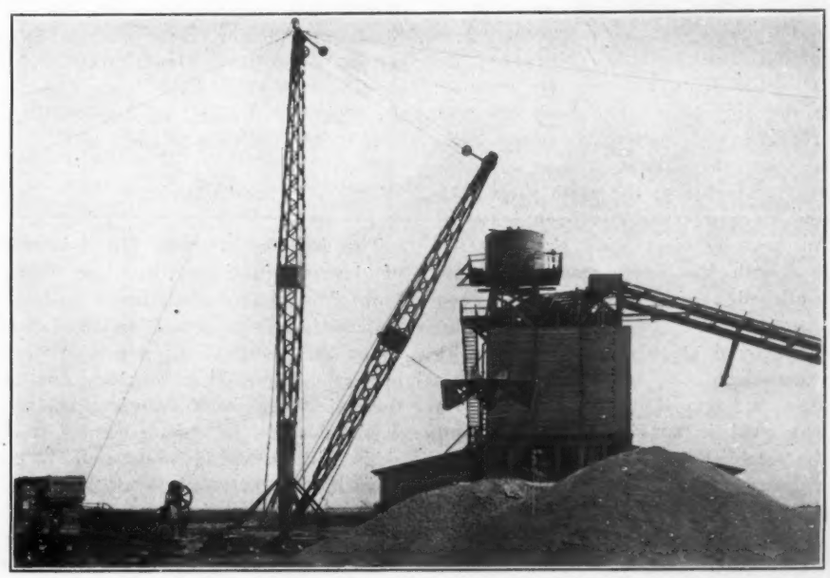


FIG. 4—CONCRETE MIXING PLANT AND STEEL DERRICK USED IN THE CONSTRUCTION WORK

manner and will be spaced 84 feet from center to center. Fig. 1 shows the open-hearth building under erection. The steel work for this structure has now been completed and the foundations for the furnaces are laid. At the right in the foreground of Fig. 1 are shown the foundations for the ingot stripper and soaking pits. At the present time the steel work on the merchant mill building is nearly completed and the walls are in the process of erection.

It may be stated at this point that all of the buildings will be completely enclosed and special care has been taken to make the plant comfortable in the rigorous winter climate. The buildings will constitute a new departure in mill construction, since concrete blocks will be used exclusively for the walls. These blocks are being made on the ground as the work progresses. A double block system has been adopted which provides uninterrupted air passage through the walls. All of the buildings will be roofed with tile and steel frame windows are being employed throughout.

Shop Buildings

Among the first buildings to be erected were the machine shop, 280 x 140 feet; the plate shop, 140 x 80 feet; the forge shop, 140 x 65 feet, and the power house, used for construction purposes, 100 x 40 feet. The power house is equipped with two 400-horsepower, Babcock & Wilcox water tube boilers and with a 500-kilowatt, 250-volt, Crocker-Wheeler generator, direct-connected to a Cooper cross-compound engine. A Nordberg air compressor is also installed. The machine shop has an area of 56,000 square feet. The central bay is equipped with a 25-ton Morgan crane and 5-ton Morgan cranes are installed in the side bays. The tools are well arranged and individual motor drive is used throughout. For handling heavy weights in the plate shop a 15-ton Morgan crane has been installed. An area 400 feet wide by 1,250 feet in length has been reserved at the south edge of the works for a coal storage plant. In order to prepare the ground at this point considerable excavation was necessary, and the sand and gravel which was removed was used in making concrete. Thus the establishment of a separate gravel pit was obviated.

One of the principal features of the works at the present time is the concrete mixer which has been installed west of the rail finishing department. This plant is shown in Fig. 4, which also illustrates one of the large steel derricks furnished by the Clyde Iron Works, Duluth, for handling sand, gravel, etc. All of the concrete is prepared at the central mixing plant, and is conveyed to the point where it is to be laid in buckets placed on flat cars. The material from which the concrete is made is first placed in three screening bins, equipped for screening sand, fine and coarse gravel. From these bins the materials are chuted into a measuring hopper, from which they are carried by a skip to the top of the structure and deposited in storage hoppers. Under the storage hoppers is installed a 1¼-yard concrete mixer, furnished by the Municipal Engineering & Contracting Co., Chicago. This machine can deliver a batch of concrete each minute. The mixer discharges directly into the distributing buckets which are placed on flat cars. These buckets have a capacity of 1½ cubic yards each and are equipped with drop-bottom doors. Five buckets are carried on a flat car.

At the point where the concrete is to be laid, the buckets are hoisted off the car by a derrick and swung into the proper position before the bottom doors are released. Each bucket has two bails and the derricks are provided with two running cables. One cable supports the weight of the bucket while the other controls the doors.

Although the winter climate at Duluth is very severe, it has not interfered with the laying of concrete. In cold weather the batches are mixed hot and special precautions are taken to protect the newly laid courses from frost-bite. Some of the concrete has been laid in temperatures as low as 18 degrees below zero without any serious difficulty. Over 70,000 cubic yards of concrete have been laid at the plant up to date. In August, 1911, over 7,108 cubic yards were laid.

Steel Derricks

The derrick shown in Fig. 4 is one of several furnished by the Clyde Iron Works for handling concrete materials and for general utility work about the plant. The mast is 90 feet high, the boom 75 feet in length and the bull wheel is 20 feet in diameter. Each derrick is mounted on steel skids with turned-up ends made from 12-inch I-beams, 24 feet long. Facilities are provided for blocking up the derricks to prevent capsizing. Each derrick has a capacity of 10 tons and weighs complete with skids, 19,650 pounds. They are entirely portable. Electric hoists furnished by the Clyde Iron Works are used in connection with the derricks. Each hoist is equipped with three drums having a capacity of 12,000 pounds on a single line, at 144 feet per minute. The hoists are driven by 75-horsepower, Westinghouse, mill type motors.

The plant will have a capacity when the present units are completed, of approximately 1,000 tons of rolled steel per day. Construction work is being vigorously prosecuted this winter and it is expected that the works will be complete some time during the latter part of the summer.

Use of Oxygen Helmets

The Oliver Iron Mining Co. is providing all of the districts in the Lake Superior country in which it is operating underground mines, with oxygen helmets and phometers, the latter to be used in restoring to consciousness workmen overcome by smoke or gas.

The Oliver company's committee on the Marquette range will be headed by Clifford A. Barabe, one of the civil engineers, and the men who are now familiar with the use of the equipment will instruct workmen at each of the corporation's mines in the district.

The helmets are of the Dredger type, and are different in construction from the helmets purchased by the Cleveland-Cliffs Iron Co. The Cleveland-Cliffs helmets are smaller and lighter than those put in by the Oliver company, the latter weighing 43 pounds. They can be used for two hours without recharging, and are fastened to the back and shoulders by straps.

The equipment will be kept at a station in the laboratory building. The phometer is a unique piece of apparatus. It contains restoratives, and is equipped specially for the relief of men overcome with gas, smoke, drowning or electric shock.

The Independent Pneumatic Tool Co., Chicago, is now manufacturing a new "One Man" drill equipped with compound planetary gears. This drill is particularly adapted for tapping, drilling and screwing-in staybolts and studs in all sizes up to 1¼ inches. The drill weighs only 20 pounds and can be operated by one man. It is equipped with a No. 3 Morse taper socket and has the Corliss valve mechanism with which all of the drills manufactured by the Independent Pneumatic Tool Co. are equipped.

Limit of Endurance of Steel Rails Reached?

This Thought is Suggested by the Use of Hard Steel Rails and High Wheel Pressures—Cause of the Manchester Wreck

On August 25, 1911, under the direction of the Interstate Commerce Commission, its chief inspector of safety appliances, H. W. Belnap, and three assistant experts, entered upon an investigation of the Lehigh Valley railroad accident, which occurred on that date near Manchester, N. Y. Owing to the disclosures of defects in the rail, which were the apparent cause of the wreck, the Bureau of Standards was asked to co-operate in an examination of the pieces of defective rail. A broken rail, 247 feet west of a steel girder deck bridge spanning the Canandaigua Outlet, caused the derailment of the train. At the point of the accident, the Lehigh railroad maintains a double track line, running east and west, and the tracks are laid with 90-pound steel rail, 33 feet long, with class A ties, about 18 to the rail. Tie plates are used on each tie and the rails are double-spiked on the inside of the rail through these plates. The place of derailment is on a tangent and the grade is practically level.

James E. Howard, the eminent engineer-physicist of the Bureau of Standards, made an exhaustive examination of the fractured steel rail, and he points out that current railroad practice in the use of hard steel rails and high wheel pressures has nearly, or quite reached the limit of endurance of the metal of the roadway. He states further that the mills are making the steel which they are required to make under the specifications given them. One of the startling statements contained in the report is that the possibility of an epidemic of wrecks is not altogether a remote one from the number of fractures which are appearing within a limited territory. The following report was submitted by James E. Howard to the Interstate Commerce Commission.

Referring to incidents connected with the wreck, it appears that train No. 4, the New York and Philadelphia day express, was made up, as usual, at Buffalo, and left that city east bound on Friday, Aug. 25, at 10:35 a. m. The train then consisted of two engines and 12 cars. At Rochester Junction two more cars were added, making 14 in all. Proceeding eastward this train was wrecked in part at a place just to the east of Manchester Station at about 12:43 p. m. The circumstances attending the wreck appear as follows:

A rail was fractured on the north side of the track on which the train was running, abreast a crossover. A part of the train was precipitated from the opposite side of the track, the south side, to the bed of the Canandaigua Outlet, from the plate-girder bridge spanning the creek. The fractured rail was several rail lengths east of Manchester Station, the bridge several lengths east of the fractured rail in question.

One car from the middle part of the train fell to the bottom of the creek and was demolished; the forward end of another car, next to the rear of the one first mentioned, fell to the bed of the creek, the rear end remaining resting against the bridge. The forward part of the train reached the east side of the creek and was only in part derailed; the rear end of the train remained on the bridge and west embankment or roadbed.

Figs. 5, 6 and 7, shown on the accompanying insert, illustrate three fragments of the broken rail. The west end of each fragment appears at the left, and the east end of each fragment at the right of each of the illustrations. This arrangement brings the gage sides of the heads together on the print. Fig. 6 shows the appearance of five fragments of the broken rail.

Not a Question of Mill Practice

It is not a question of mill practice in the manufacture of the steel, further than that the mills are making the steel which they are required to make under the specifications given them. Recent occurrences suggest the thought that current railroad practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal of the roadway.

These illustrations are reproductions from photographs taken by R. E. Briggs, of Clifton Springs, N. Y., and are grouped in accordance with his statements concerning the respective ends of the fragments which belong together. The order of the fragments as they existed in the unbroken rail is not known, excepting it is understood that the left-hand illustration in Fig. 1 represents the extreme westerly end of the intact rail, showing the fractured end which was made when a new frog was put in the track in April last.

From the testimony taken before the coroner it appears that train No. 4 was just getting up speed after having drifted through the Manchester yard when the disaster occurred. The first car known or thought to have left the rails was car No. 6 in the train. The rear brakeman had his attention called by the gesture of some unknown person standing on the station platform, or near by, to the derailment of the intermediate part of the train. He pulled the signal cord. The engineers of both engines heard the signal whistle blow, the first warning of the disaster which had then begun. Prior to that instant there had been no drop in the air pressure of the brake system nor was there then. Brakes were applied by the engineer of the leading engine, and the forward end of the train brought to a standstill.

From evidence to be mentioned later, it appears that with the breakage of the north rail the part of the train affected first changed its course sidewise toward the north, but was subsequently, by reason of some force, swerved in the opposite direction and precipitated from the bridge sidewise in a southerly direction. An important consideration pertains to the recognition of a force adequate and acting at the right instant of time to change the direction of the affected part of the train with such disastrous consequences in order to understand the events in sequence.

The subsequent burning of the ties, as testified to before the coroner, destroyed evidence of the path of the trucks from the broken rail to their plunge from the bridge.

Broken Rail Flange

The broken flange of the base on the north side of the fractured rail, and what appear to be wheel flange marks on the fragments of the head, indicate that the truck wheels got over on the northerly and outer side of the rail; that is to say, the first impulse of the affected part of the train was to swerve toward the north and not toward the south side of the track where it eventually went.

Since the crossover rail was abreast this point, the truck wheels would be expected to strike a glancing blow against it and be driven from their course in the opposite direction, that is toward the south. Then the query arises whether such a blow would be adequate to drive cars, in the middle of a train as these were, over against the southerly rail of the track, precipitate two to the creek bottom and roll one car over on its side beyond the far end of the bridge.

Some other force than that resulting from striking the crossover rail seems necessary to account for such subsequent events. The only other recognized force present was the battering effect of the rear portion of the train, then on the rails, against the derailed portion in front of it, accentuated possibly by the sudden application of the brakes, provided the brake resistance preponderated at the head end of the train.

The kink in the train was certainly greatest at the place occupied by the car which was destroyed by its fall from the bridge, and furthermore the train was evidently brought to a standstill very soon after the brakes were applied.

Central Guard Rail

There was another condition present in the track in which there seems a chance which may have contributed toward the disastrous results witnessed. That chance pertained to the central guard rail of the bridge. If a truck was driven back from the north side, across the south rail, and so as to engage the guard rails on the south side of their facing ends, there might be an impulse to drive the truck still farther in a southerly direction. That the central guard rails contributed toward the wreck, however, seems improbable. On the other hand possibly they did not fully serve their function in mitigating the consequences of the derailment. It is understood that the guard rails have been extended in a westerly direction since the time of the wreck and now reach a point nearer the crossover than formerly. The average rate of speed was low when the train buckled, and was probably almost at a state of rest when it reached its maximum amount.

From the testimony taken before the coroner it is learned that the weights of the two engines or locomotives which hauled the train were as follows:

Forward engine, No. 2476, Atlantic type, 196,500 pounds.

Second engine, No. 1804, 10-wheeler, 199,500 pounds.

Concerning the fractured rail, it was a 90-pound American Society of Civil Engineers section, basic open-hearth steel, made by the Bethlehem Steel Co., heat No. 14,208, 20 per cent discard, rolled Dec. 24, 1909. It was an A-rail from the ingot. The steel was made on specifications calling for carbon content between 0.70 and 0.80 per cent.

Excessively High Wheel Pressures

That the formation and development of the internal fissures is due to the use of a hard steel and subjecting it to high wheel pressures, wheel pressures which are excessive from a metallurgical point of view, thereby causing the development and introduction of internal strains, and those internal strains in turn together with the wheel loads cause the development of internal fissures and their extension to a dangerous degree. Such internal and hidden fissures are a menace to the safety and lives of persons traveling over such rails.

According to the testimony, this rail was laid Oct. 21, 1910, in the east-bound track, where it eventually fractured. Frogs were changed about April 20, 1911, at which time this rail was shortened by cutting off 6 feet from its west end, reducing its length from 30 to 24 feet. Three new bolt holes for splice plates were drilled in the web at the time of cutting off.

It was brought out in the testimony taken before the coroner that this fractured rail exhibited two kinds of defects. It had a piped web, and in addition thereto it also displayed in the head a number of dark spots, which it should be said are light, silvery ones in certain fresh fractures. The surfaces of those spots are normal to the length of the rail. They have recently attracted attention, but no colloquial name has been given them.

Rail Specifications

The specifications under which this rail was rolled required not less than 20 per cent discard from the top of the ingot in order to secure sound steel. Notwithstanding this requirement, nor the mill, nor the track inspection, this rail got into the track, where it remained for a period of 10 months, until the time of this disaster. The specifications require shearing to continue if, after 20 per cent discard, the metal does not appear to be solid, until it does. If the shearsman could judge of the defect in the steel which, when rolled, caused this split web the entire length of the A-rail, then that requirement of the specifications was not met. If, on the other hand, his opportunity is not adequate to allow of the discovery of such defective steel, then the requirement has a perfunctory character, so far as pertains to the rolling mill.

Whether the split web was in evidence as such on the hot sawed ends of the rail can not be definitely stated, since neither end was present when fragments of the rail were examined. The end which originally formed the west end of the rail had been cut off at the time of putting in the new frog, while the original east end had been cut off and removed since the time of the wreck, it was understood, by or for the New York Public Service Commission. The split, however, was visible on the ends of the several fragments which were available and examined. The split was also visible in a new hole drilled through the web alongside of one of the holes understood to have been drilled through the web at the time of putting in the new frog.

Test of Web

Under direct compressive stress the web was very strong notwithstanding the presence of the split. A section of this rail, 1 inch long, sustained a load of compression applied on the running surface of a head of 75,420 pounds. This piece which was tested came from a fragment less than 2 feet distant from the west end of the rail, as it existed at the time of the wreck, and represented therefore an unfavorable part of the rail. It displayed some toughness and opened along the seam in the web before final rupture.

Concerning the defects witnessed in the head of the rail reference will

be made to expert testimony and opinion held by those of prominence for the purpose of showing the current trend of thought, although the writer does not entertain the same views as those which will be quoted, but, on the contrary, looks at the case from an entirely different standpoint, as will later be explained.

The views concerning this development which have reached the writer have attributed the cause of these so-called defects to some unidentified and unknown reason connected with the process of manufacture of the steel. Expert testimony taken before the coroner states that the dark spots in question "indicate a decided defect in mill practice, but can't say positively what may have caused it, but we can say that something in connection with the manufacture of that rail caused a separation of the metal at that point, constituting that defect," and more to the same effect.

The manufacturers of the steel clearly take the same view as expressed in the testimony before the coroner, since it is understood that the Bethlehem Steel Co. is at present engaged in a very energetic inquiry into the physical condition of their rails, but it may be said that their inquiry has up to the present time developed no information nor clue to the formation of these defects, nor have such defects been found in any of the new and unused rails of their current manufacture.

One prominent consumer seemed to entertain the thought that different ores had been used that for some occult reason refused to mix well metallurgically, resulting in the introduction of structurally defective zones in the steel. It will be recalled that not long ago, counted almost by months instead of years, Bessemer rails were in disfavor and a demand made for open-hearth metal, which resulted in the installation of a number of new open-hearth plants for rail making and the conversion of others.

Epidemic of Wrecks

It appears that fractured rails resulting from transverse fissures in the heads are not confined to the experience of one railroad. Their development is a matter of the utmost gravity and introduces an element of danger in railway travel most menacing. To this hidden danger is perhaps primarily due the 29 dead in the Lehigh Valley railroad wreck. From the number of fractures which are appearing within a limited territory the possibility of an epidemic of wrecks is not altogether a remote one.

Referring now to the examination of the fragments of the broken rail made at the Bureau of Standards, before undertaking which, however, a visit was made to the scene of the wreck and all accessible pieces of the fractured rail inspected. This visit was made to the scene of the wreck in company with H. W. Belnap, chief inspector of safety appliances, Interstate Commerce Commission, Oct. 3, and the following day to the works of the Bethlehem Steel Co.

At Manchester on Oct. 3, there were present: E. H. Letchworth, attorney for the Lehigh Valley railroad; Dr. D. A. Eiseline, coroner; Robert Job, consulting engineer; G. L. Moore, engineer of maintenance of way, Lehigh Valley railroad; and others in addition to Mr. Belnap and the writer.

At the Bethlehem steel works the process of rail making from the duplex Bessemer open-hearth process to the finished rail was witnessed.

An Epidemic of Wrecks

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While at Manchester photographs were made, Figs. 7 and 19, showing the accessible fragments of the rail, the aggregate length of which was about 12½ feet, a little more than half of the rail being present. Some 200 pounds were said to be in the possession of the New York Public Service Commission, while some pieces were not recovered from the wreck.

Pieces lettered *D*, *E*, *F*, Fig. 19, and a section sawed from *B*, were made available for examination and test, the latter piece through the courtesy of Dr. Eiseline, while the length marked *H*, through the courtesy of G. L. Moore, was forwarded to the bureau to supply further investigative material of the rail.

Piece *A* was the west end of the 24-foot rail and length *H*, the east end. A short fragment had been knocked off the east end of length *H*, after nicking with a cold chisel to furnish a sample for the New York Public Service Commission.

Fragments of Rail

These fragments in Fig. 19, are viewed from the gage side of the rail. The outer flange of the base of length *H* was broken off for a distance of 33 inches, beginnnig at the westerly end of the same. End views of five fragments are shown in Fig. 7, all of which are east ends of the respective pieces excepting *A*. Owing to the small size in the photograph the split in the web of piece *A* is not clearly shown, but the same end appears on the left side of Fig. 1.

The marking of the transverse fissures of the head on ends *C*, *F*, and *G* is indistinctly shown. The west end of fragment *G* had a semi-circular indentation near the center of the running surface of the head. This indentation was thought to have been made by a wheel flange striking the end of this fragment in mounting or attempting to ride the running surface.

Some of the wheels clearly got over to the outside of this rail and broke off the pieces of the outer flange of length *H*. This semi-circular indentation is thought to be evidence of the northward travel of a truck. Similar marks are shown on the east end of the fragment in Fig. 2, and the west end in Fig. 3, while the battered gage side of the heads, both west ends, of these two illustrations showed climbing tendencies of some of the wheels. Certain of the trucks apparently crossed over this rail to its north side.

The head was broken into short pieces 31 inches and more east of the west end of the rail. Fragments *A*, *B*, and *C*, Fig. 19, formed parts of one piece which was 31 inches long. This was sawed apart subsequently to the wreck.

Battered Rail

Where the short pieces of the head were located there doubtlessly was found a gap in the track that let the trucks over in a northerly direction to the outside of length *H*. The full length of this gap was not at one instant formed. The battered west ends of fragments *D* and *E* furnish evidence that the pounding of several trucks was withstood before the webs succumbed and the head broke off in short pieces.

Figs. 21 and 22 show the appearance of fragment *D* of Fig. 19. The battered end, the left end in Fig. 21, indicates how severe were the blows received before it was detached from

the other part of the rail. Obviously this fragment could receive such a pounding only prior to its being detached from the part of the rail beyond. This fragment, as well as that marked *E*, was battered on its west end, in the manner it would be by a train passing over it in the direction of train No. 4.

Fig. 22 shows this fragment from the underside of the head, and shows the split in the web in which was found a substance believed to be slag. It will be understood that this fragment was doubtless forced into the roadbed or against ties more or less covered with pieces of coal and other material. This remark is necessary to explain why material collected for chemical analysis from the web was in poor condition to show the original composition before the rail broke.

The analysis gave the following composition of this material in the split in the web:

SiO_2.	Al_2O_3.*	CaO.	MgO.	Not determined.†
Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
23.2	20.5	40.8	7.5	8.0

*Comprises Al_2O_3, Fe_2O_3, TiO_2, P_2O_5, Mn_3O_4.
†H_2O, CO_2, a little coal, perhaps SO_3 and alkalies..

From the above composition it was inferred that this slaglike material was rolled into the rail through the several passes down from the ingot, earlier coming from the ladle, and had its origin in the steel furnace.

Fig. 8 shows the appearance of fragment *E* with its battered end. The time when this fragment was detached from the rest of the rail with reference to the time when *D* was detached can not be stated. It appears to have been struck by a wheel or wheels of broad tread, the battered effect extending across the full width of the head without evidence of a wheel flange having hit it. This appearance would suggest that it was an earlier fragment than *D*, which was battered cornerwise on the gage side of the head. The trucks had not perhaps changed their course at the time fragment *E* was broken off, but had done so when *D* was detached. The slag streak in the web was present in fragment *E*.

Strength of Web

Why there were a number of short fragments with ends very much battered and long fragments broken with less battered ends is a matter of speculative interest. The strength of the web, even with the split, was very great, as the test of a section 1 inch long showed. The heaviest wheel load is assumed to have been on the locomotives. It would seem to harmonize with the appearance of these short fragments to believe that the primitive fractures were caused by the locomotives; that one by one these short pieces were detached after some very severe pounding had been sustained; that the next in the order of events was the breaking of the longer pieces. Necessarily the spikes would in the meantime have been drawn more or less as the forward wheels of successive trucks struck these parts of the rails. The fissures existing in the head of the rail, as it is believed they did, and with loosened spikes would present a condition facilitating the further rupture of the rail in a brittle manner. It seems certain that no such resistance against the fracture of the rail was subsequently encountered by the train above that of the small fragments. The small fragments of the head being detached, as they were, from a middle part of the length of the rail, with a great display of resistance on their part against being detached from the web and base, called for a succession of heavy blows such as the locomotives would be capable of delivering rather than the coaches. It suggests that the destructiveness to the track was heightened by reason of there being two locomotives present.

When admitting steam to get the train under headway would seem a critical period in regard to overstraining the track, more so in the case of a double-header and long train than in the case of a short one. Momentarily, the forward engineer being the one naturally first to admit steam or to accelerate the speed of the train, the train resistance would tend to overturn the forward locomotive, pull it over backward, relieve the pilot wheels of some load, and intensify the pressure on the drivers and, therefore, apply a maximum load to the rail.

Limit of Endurance of Steel Rails

The limit of endurance of iron rails was reached long ago. Train loads and wheel pressures soon became too great for iron rails to stand up under and they were replaced by steel rails. There is undoubtedly a limit to the endurance of steel rails as in the case of iron. It is important to ascertain whether the great reason of the Manchester disaster does not lie in the direction that the danger zone of steel rails has been reached and possibly entered into by current railroad practices.

As to the fiber stresses in the rail which would result from these two locomotives, coupled together in the usual manner, it can not definitely be stated. Earlier tests of track have shown that the effect on the rail per ton of wheel load varies with different types of engine and with the different wheels of the same engine.

Those earlier tests showed still further that direct measurements in the tracks were essential for determining the fiber stresses in the rails—the wheel loads, tie spacing and moment of inertia of the rail section, constituting all the data available for such computation, not being adequate for the purpose. The depression of the roadbed so modifies the conditions that direct experiments in the track are required to furnish this information. The supply of information of this kind is very meager, and it is desirable that track tests be conducted to furnish data on present conditions, which may in some respects be more severe than those which pertained to track and equipment at the time the earlier tests were made.

These features are here mentioned since the absence of certain information which can be abandoned, but which has not been, in a measure restricts an inquiry of this kind into the causes of a disaster.

Continuing the description of the rail fragments, Fig. 9 shows a piece about 4 inches long which was sawed out at Shortsville, N. Y., from fragment *E*, in the possession of Dr Eiseline. A new hole was drilled in the web 1 3-16 inches in diameter This new hole displays the split in the web.

Carbon in Steel

The end of this fragment was drilled with groups of holes in six places, and the chips used for chemical analysis of the steel. The position of the holes are shown in Fig. 10, which is an end view of the rail after having been polished and etched with tincture of iodine.

The results of the chemical analyses were as follows:

Sample.	Carbon. Per ct.	Sulphur. Per ct.	Phosphorus. Per ct.	Manganese. Per ct.
A(1)	0.843	0.030	0.042	1.20
A(2)	0.829	0.030	0.042	1.20
B	0.831	0.032	0.044	
C	0.832	0.035	0.041	1.22
D	0.867	0.032	0.044	
E	0.868	0.035	0.043	1.18
F	0.829	0.051	0.040	

It will be noted that samples *D* and *E* show the highest carbon to be located at the web and middle of the base. There appears no material difference in the carbon content at *A* on the gage side of the head over that of *C* on the opposite side. While

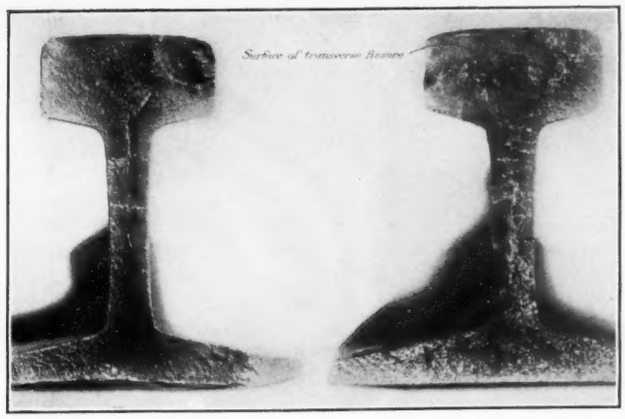


FIG. 1—END VIEWS FIRST FRAGMENT OF RAIL, WEST END

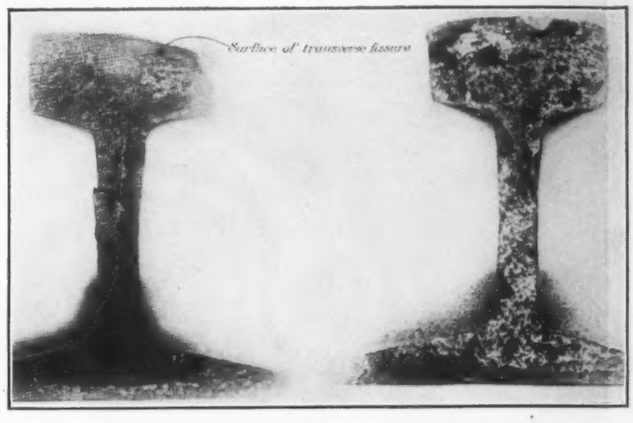


FIG. 2—FRAGMENTS OF RAIL; SURFACE TRANSVERSE FISSURE AT LEFT

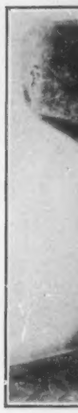


FIG. 3—

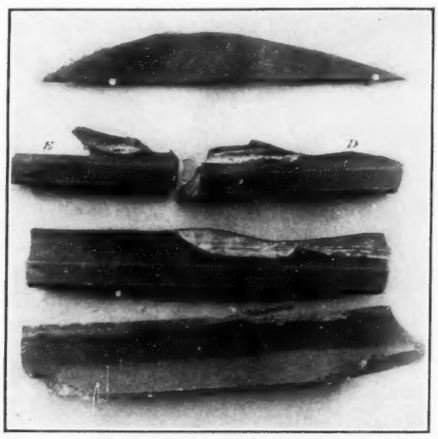


FIG. 6—FRAGMENTS OF BROKEN RAIL

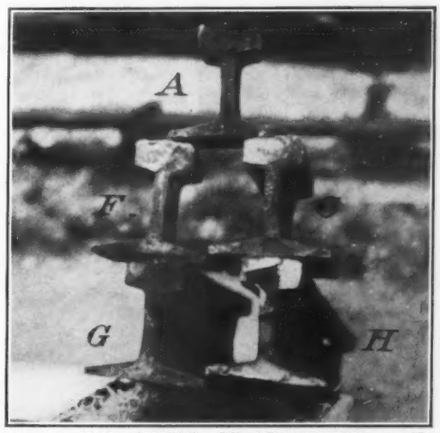


FIG. 7—END VIEWS OF FRACTURED RAIL

FIG. 8—END V

FIG. 12—SLAG SPLIT WEB AND TRANSVERSE FISSURE IN *F*, FIG. 19

FIG. 13—RESULT COMPRESSION TEST ON *F*, FIG. 19

FIG. 14—END O TEST, *F*

FIG. 18—FISSURE IN HEAD OF AN E-RAIL

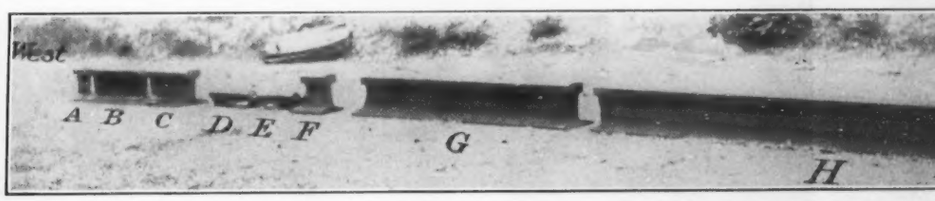


FIG. 19—FRAGMENTS OF THE BROKEN RAIL; RELATIVE POSITIONS OF *D*, *E* AND *F*

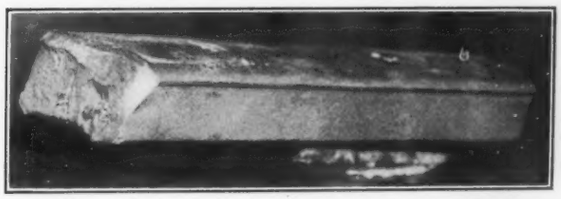


FIG. 21—BATTERED CONDITION FRAGMENT, *D*, FIG. 19

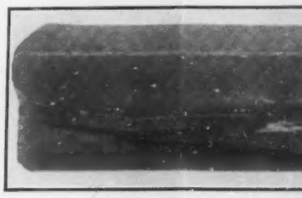
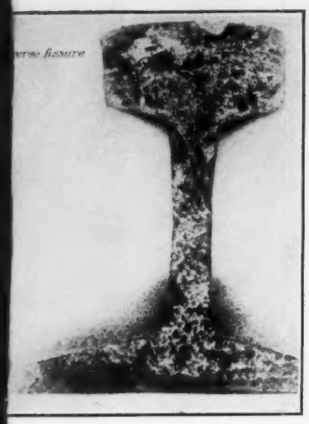


FIG. 22—SLAG SPLIT WEB U

Insert, THE IRON TRADE REVIEW, *Feb. 8, 1912.*



L; SURFACE TRANSVERSE
AT LEFT

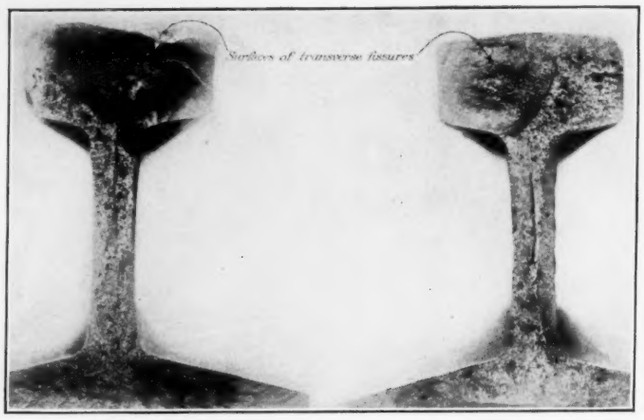


FIG. 3—RAIL SHOWING SURFACE OF TRANSVERSE FISSURE AT EACH END

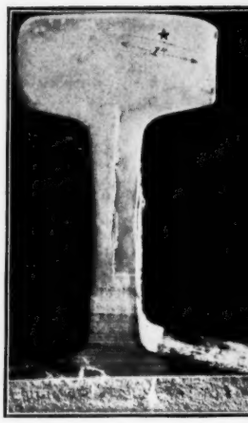


FIG. 4—ETCHED SECTIO
SEAMS IN HEA

ED RAIL

FIG. 8—END VIEW, *E*, FIG. 19

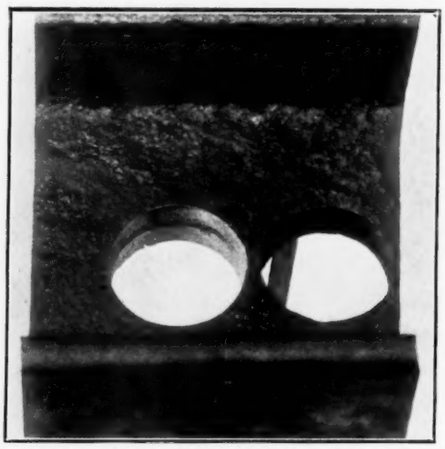
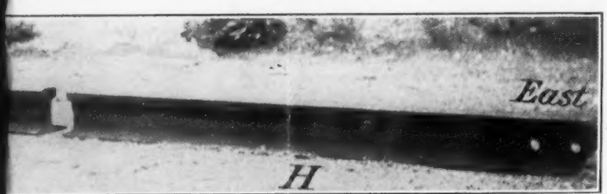


FIG. 9—HOLE DRILLED IN *B*, FIG. 19, SHOWING SLAG SPLIT

ION

FIG. 14—END OF COMPRESSION TEST, *F*, FIG. 19

FIG. 15—SEAM IN HEAD, *H*, FIG. 19



RELATIVE POSITIONS OF *D*, *E* AND *F* NOT KNOWN

FIG. 20—SECTION *H*, FIG. 19,

D,

FIG. 22—SLAG SPLIT WEB UNDER HEAD, *D*, FIG. 19

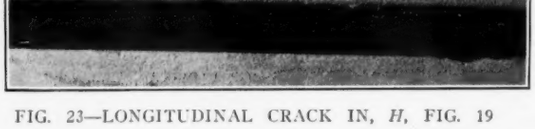
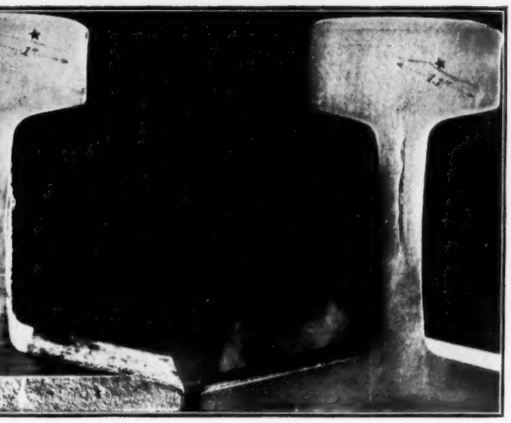


FIG. 23—LONGITUDINAL CRACK IN, *H*, FIG. 19



HED SECTIONS FROM *B* AND *F*, FIG. 19, SHOWING MS IN HEAD AND SLAG SPLIT IN WEB

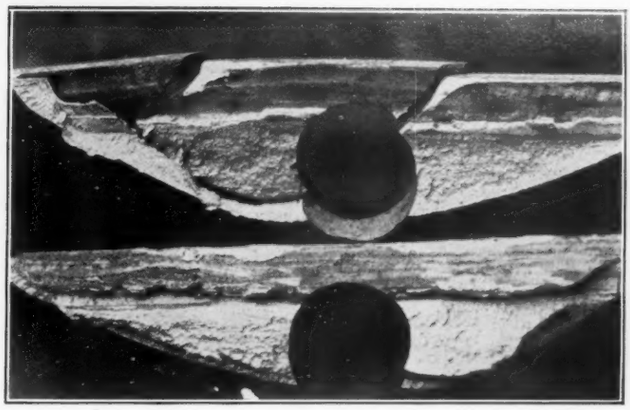


FIG. 5—FRAGMENT *H*, FIG. 19, WEDGED APART, SHOWING SLAG SPLIT

FIG. 10—ETCHED SECTION FROM *B*, FIG. 19

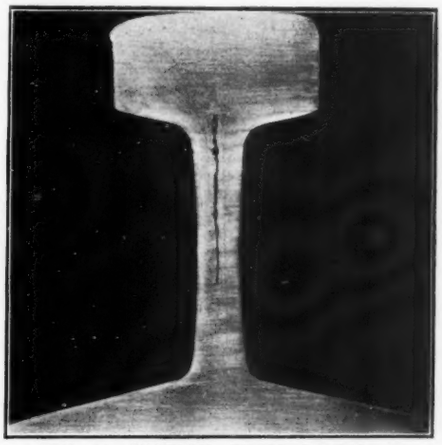


FIG. 11—SECTION FROM *B*, FIG. 19, SLIGHTLY REPOLISHED

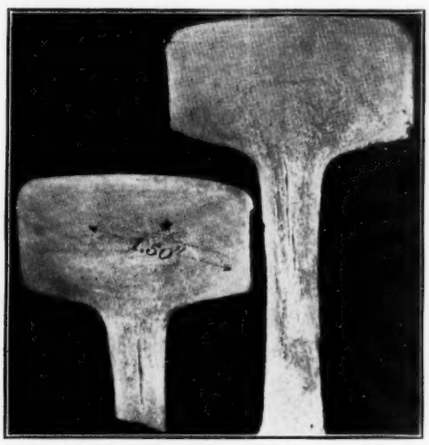
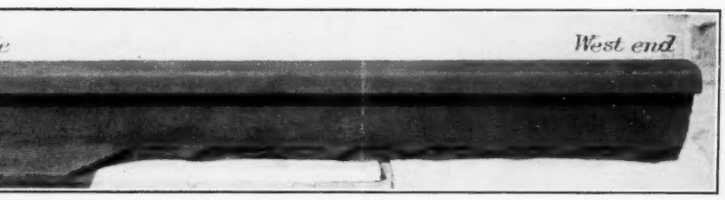


FIG. 16—ETCHED END VIEWS, *H*, FIG. 19

FIG. 17—TRANSVERSE FISSURE IN HEAD OF *H*, FIG. 19



H, FIG. 19, SHOWING BROKEN FLANGE

FIG. 19

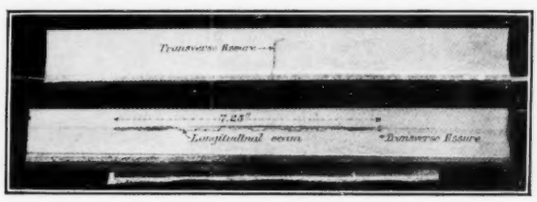


FIG. 24—SEAMS AND TRANSVERSE FISSURES, *H*, FIG. 19

FIG. 25—ETCHED SECTION OF HEAD OF E-RAIL

the metal at the running surface of the head displayed greatest resistance against machine tools and sawing, it does not appear substantially different in carbon content than the sides of the head nor the metal near the edge of the flange. The markings on this etched section appear symmetrical in the metal of the head and show no characteristic difference between the two sides of the head. In this examination there is no evidence presented to show a difference between the metal on the gage side of the head, which, so far as observed, is the side which invariably displays the interior transverse fissures, and the opposite side of the head, which has not exhibited these fissures.

Slag Streak

Fig. 11 shows this same cross-section after lightly polishing and removing some of the effects of the iodine etching. The deeper etched lines remain. The dark streak at the middle of the web represents the slag streak. In Fig. 10 there appears a faint line about halfway down the depth of the head and on the half of the gage side, the location of which is indicated on the print by a star. This line, about one-half inch long, represents a crack or fissure in the head, viewed on end; that is, a longitudinal crack the surface of which inclines downward toward the gage side of the head. This longitudinal crack was visible at each end of fragment *B*. It, therefore, appears that in the head of this rail are witnessed both transverse and longitudinal cracks or fissures, each kind being found in the metal of the gage side or half of the head.

Fig. 12 shows the east end of fragment *F*. The west end of this piece was a sawed end. The presence of the surface of a transverse fissure on the gage side of the head is shown, also the split web. From the middle of the length of this fragment was taken the section 1 inch long which was tested by a load being applied on the head.

Fig. 13 shows the 1-inch section as it appeared at one stage during the test. The ultimate strength was 75,420 pounds, as previously stated, on the section 1 inch long by 0.58 inch thickness of web, or 130,000 pounds per square inch. After passing the maximum stress the load sustained fluctuated for a time between 72,000 and 74,800 pounds, then fell rapidly, and when it had dropped to 45,600 pounds the cracks in the web were developed, as shown by Fig. 14.

A general view of fragment *H* is shown in Fig. 20, taken from the outside of the rail. The east end of this fragment is that on the left end of the engraving.

The broken flange will be noted, caused, it is believed, by the truck wheels getting across to the outside of the rail and with their flanges breaking off pieces of the outer flange of the rail.

A longitudinal crack was found in the head of this fragment, as indicated, the crack making its appearance on the gage side, abreast the place where it is marked. Fig. 23 shows this crack about full size. The side of the head had been spotted with a chisel at the middle of the length of this seam before the photograph for this illustration was made. It was found that this longitudinal seam extended across the full width of the head and that it was associated with an interior transverse fissure near its west end.

At a place near the middle of the width of the head this seam was longer than at the surface at the gage side of the head. It measured 7¼ inches long near the center of the head. Following the seam toward the outside of the head, it came to the surface near the outside edge of the running surface of the head. That is, the seam viewed on a cross-section of the rail would present an oblique line dipping toward the gage side of the head, a shearing direction with reference to a downward load on the head.

Primary Cause of Wreck

It is believed that present evidence points to the inference that the primary cause of the Manchester wreck was the formation and development of transverse fissures and longitudinal seams in the head of this rail which eventually fractured in the track, aided by the defective metal of the web.

Head of the Rail

The head of the rail was split along the middle in a planer, bringing to view the interior part of this seam. The lower figure in Fig. 24 shows it. A transverse seam, or fissure, as it has been called, is seen at the right end of the longitudinal seam, this being the west end of the latter.

Another transverse fissure was found in this fragment of the rail, the fissure being on the gage side or half of the head, as usual. This second fissure was located about 40 inches from the first, toward the east end of the rail. The upper illustration of Fig. 24 shows it, and it will be noted that the upper end of the fissure branches off longitudinally in each direction.

This fissure extended to the gage side of the head and could be seen on the rolled surface. While this was the case, the line of fracture being visible to the eye, still it was not sufficiently pronounced to attract ordinary observation. Its vagueness in appearance would cast a doubt upon its identity if perchance its discovery had been made in the track. The crack may be seen on the side of the head, but it would be unreasonable to expect its discovery in the track except by accident. The detection of such fissures, or rather all such fissures if of frequent occurrence, would be a task practically too great to accomplish under service conditions. The insidious character of these fissures is a most disquieting feature of the case. Here are fissures of the most dangerous character which embrittle the rail and lead to fracture without display of ductility in the steel and which are so hidden as to practically defy detection under ordinary close scrutiny.

Seam in Rail

The obliquely inclined longitudinal seam at the east end of the rail in fragment *H* is shown in Fig. 15. The end was cut off to furnish a specimen, it is understood, to the New York public service commission, and so mentioned earlier in the report.

A short section was sawed off the east end of this fragment, polished and etched with tincture of iodine. Its appearance is shown in Fig. 16, at the left. The obliquely inclined longitudinal seam is seen on end in the middle part of the gage side of the head. The dark line in the web indicates the slag split, which was traced, so far as these fragments permitted, from end to end of this 24-foot rail. The figure on the right side of this illustration represents the etched cross-section of the west end of fragment *H*. The symmetrical markings of the etched surface will be noted. On this and the other etched surfaces of this rail a satisfactory structure was exhibited and no indications were present of any material difference between the gage side and the outside of the head. Fig. 17 shows the west end of fragment *H*, this end having had the outer flange of the base broken off.

Fig. 5 shows the slag seam in the web in the vicinity of the inside bolt hole of the east end of fragment *H*. This was wedged apart, after the head

of the rail had been cut off in the planer, exposing the streak of slag to view.

Fig. 4 shows two polished and etched cross-sections of the rail, in each of which appears an obliquely inclined longitudinal seam. The figure on the left is an end view of the piece from fragment *B*, while the figure on the right is from *F*, hence it appears that longitudinal seams as well as transverse fissures existed in several places in this rail.

Figs. 18 and 25 represent another rail, an E-rail, it is said. This was a small triangular piece about 1½ inches long on the top of the head. The fracture was a fresh one and the fissure on the gage side of the head exhibited a silver luster. The oval boundary of the fissure is clearly shown by the illustration. The etched surface, only about 1 inch distant from the fissure, shows symmetrical markings and without suggestion of the development of a fissure so close at hand.

Internal Strains

In cutting off the head from the web of fragment *H* in the planer the detached head sprung into a curved shape, with the running surface on the convex side. The deflection at the middle of the length of the piece, 5 feet long, was 0.20 inch. The deflection represented the release of internal strains of compression at the running surface of the head. This points out an important feature to consider in reference to the development of internal fissures such as were witnessed in this rail. The cold rolling of the running surface of the head of the rail by heavy wheel pressures has introduced internal strain in the steel at and for a short distance below the running surface. Those internal strains are of compression, and they reach their greatest intensity on the gage side of the head where flow of the steel takes place in a lateral direction. That lateral flow is shown by the ridge or fin of metal which was formed along the gage side of the head. When the rail is intact and the top surface or layer of metal of the head is in a state of initial compression it follows that there must be an opposite strain of tension to balance it in some portion of the rail. The tensile component would be expected in the vicinity of and next below the part which was affected by compression strains, and this leads to an explanation of the presence of fissures in the head where they are being formed. No foreign substance in the steel is needed to account for the inception of those fissures. The introduction of internal strains in a hard and less ductile steel than heretofore used for rails, under excessive wheel pressures, seems adequate to explain the occurrence and frequency of these interior fissures.

Fissures in Rails

The fissures, if this explanation of their origin is true, should not be found in new rails, unused, and it is understood that the steel company that rolled this particular rail has been unsuccessful in finding any such fissures in new rails, notwithstanding a very energetic effort has been made to discover them. These fissures are not held to be defects resulting from improper mill practice. They appear to be the result of excessive wheel pressures acting on a very hard steel, steel which is hard by reason of its chemical composition.

This development of internal fissures and seams, transverse and longitudinal, suggests that the limit of wheel pressures in conjunction with the bending and shearing stresses which occur simultaneously therewith has been reached and surpassed on rails of usual width and shape of head. The frequent occurrence of broken rails is a warning of this kind. In the earlier days of steel rails softer and more ductile metal was used. The wheel pressures were lower then than they are at present.

With increased wheel pressures harder steel was employed to give endurance to the rails. For a time it seemed that the metal of the rail was worn away by abrasive action about as fast as the immediate running surface of the head was affected by the cold rolling. The wheel pressures were not at that time so great as to disturb the steel in a serious manner at the head in the case of hard rails.

Wheel Pressures

Soft steel rails would flow under the increased wheel pressures and while the metal of the running surface of the head became very brittle in consequence of the cold flow, yet the ductility of the steel was adequate to prevent the formation of interior fissures in the zone of the head below the affected metal.

Internal strains of compression were introduced the same then as now, but the toughness of the steel enabled it to endure such conditions without rupture.

There must be a limit in the combination of hard steel rails and high wheel pressures beyond which it is unsafe to go. Recent evidence indicates the approach to that limit in current railroad practice, if it has not already been passed.

It can hardly be a coincidence that all of the rails which are displaying these interior fissures have hidden structural defects on one side of the head and none on the other, and chance to be laid with the defective side on the gage side, where it is found. Evidence points to track conditions as accountable for the development of these fissures. They have been found as close together as 8 inches from one to another.

Progressive fractures have occurred in axles, but they started at the surface where the fiber stresses were greatest, and not at the interior where bending stresses would be very much less. The failure of axles by repeated stresses does not appear to furnish the same kind of an example as witnessed in the present rail fissures.

The rail fissures have their origin or incipiency in the head at places where the stresses from bending loads on the rail would be not over 75 per cent of the maximum fiber stress.

Some parts of the track are subjected to more severe conditions than other parts. Places where the stresses on the head from the wheel pressures are reversed in their direction would afford examples of maximum severity. Such places are found where the trains stop and start at stations.

Longitudinal Impulses

When stopping a train all wheels equipped with brakes tend to force the metal in a forward direction, whereas when starting a train a longitudinal impulse is given by the driving wheels in a backward direction. Ordinarily this reversal of stresses should contribute toward earlier rupture of the steel than where the maximum stresses are seldom reversed. Of course, all wheels of a train excepting the drivers of the engine in a degree tend to force the metal in a forward direction. This particular rail was near a station, and where frequent stops and starts might be made by reason of the presence of the crossover. The actual intensity of the stresses would be due to internal strains plus external loads. A given weight of engine might successfully pass over a rail in its original state from the rolling mill and later on cause a fracture in the same rail by reason of the introduction of internal strains from the cold rolling of the wheels. The metal of the head is alternately in tension and

compression according to the position of the wheels of the engine.

Concerning the number of repetitions of loadings, the number for a period of 10 months would be comparatively small, so far as pertains to the number of times an engine loaded the rail, while for many of the cars the wheel pressures would be much less and strain the rail correspondingly less. It is important to ascertain what fiber stresses are developed in the rails under the wheels of locomotives of the present type. This part of the subject was experimentally inquired into some 15 years ago, since which the types of engines have greatly changed. It is quite important in view of these developments that information as to their fiber stresses be acquired for present track conditions, and such information can be acquired only on the rails when in the track, so materially does the depression of the roadbed affect the strains. In connection with the present case it may be remarked that a derailment occurred in Massachusetts about five years ago, the circumstances attending which might cause it to be taken as a precursor of current experience in the use of hard steel for rails. This rail had short transverse fissures started in the head at the running surface caused by the flow of the metal from drivers slipping, heating the high carbon steel, hardening it, and causing fissures to develop. Not quite a parallel case, but one illustrating the tendencies in hard steels to reach a condition inducing fractures.

Conclusions

In conclusion, it is believed that present evidence points to the inference that the primary cause of the Manchester wreck was the formation and development of transverse fissures and longitudinal seams in the head of this rail which eventually fractured in the track, aided by the defective metal of the web.

That the formation and development of the internal fissures is due to the use of a hard steel and subjecting it to high wheel pressures, wheel pressures which are excessive from a metallurgical point of view, thereby causing the development and introduction of internal strains, and those internal strains in turn together with the wheel loads caused the development of interior fissures and their extension to a dangerous degree.

That such interior and hidden fissures are a menace to the safety and lives of persons traveling over such rails.

That recent occurrences suggest the thought that current railroad practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal of the roadway.

That it is not a question of mill practice in the manufacture of steel, further than that the mills are making the steel which they are required to make under the specifications given them.

That present developments are not inconsistent with what is known about the properties of steels in respect to the effects of intense local overstraining pressures of which high wheel pressures furnish one illustration, combined with high tensile, compressive and shearing stresses. In a way, it is a question of repeated stresses, but the number of repetitions of loading of this rail was comparatively small from its short time in service. It may be remarked that certain rail specifications require higher carbon steel as the weights of the sections increase, and also higher carbon steel for open-hearth rails than for Bessemer rails.

In view of current developments, if the causes of formation of interior fissures are those herein described, then the employment of high-carbon metal is attended with dangers not apparently recognized in the drawing up of current specifications. It is desirable that measurements be made in the track of the fiber stresses which are caused by the new types and weights of locomotives in order to acquire necessary information to judge of the severity of the strains which the rails are being daily exposed to, information which is now lacking.

Finally, it may be said, referring specifically to the development of the short transverse fissures in the heads of the rails and which are found on the gage side of the head, that they are believed to constitute a grave danger. If, as now supposed, they are the direct result of high wheel pressures acting on hard steel, then the danger is widespread. The Manchester rail, omitting reference for the time being to the slag split in the web, was fissured in many places. Apparently a number of transverse seams and longitudinal fissures were developed in the track, as the result of a few months' service. The fissures occupied positions in harmony with the explanation of the cold rolling and shearing effect of high wheel pressures acting on a steel too hard to respond without the development of interior fractures. The effect was necessarily intensified by the bending stresses on the rail from the direct downward loads.

The limit of endurance of iron rails was reached long ago. Train loads and wheel pressures soon became too great for iron rails to stand up under and they were replaced by steel rails.

There is undoubtedly a limit to the endurance of steel rails, as well as in the case of iron. It is important to ascertain whether the great lesson of the Manchester disaster does not lie in the direction of signifying that the danger zone of steel rails has been reached and possibly entered into by current railroad practices.

If this explanation is found correct, then the remedy does not consist in increasing the weight of the rail, but in diminishing the intensity of the wheel pressures and lowering the direct compressive and the bending stresses.

While the Manchester rail was defective in the web, the feature which seems most grave is the general shattering of the integrity of the rail, apparently coming from the combination of a hard steel and high wheel pressures.

Data Sought

Complete data are demanded by this inquiry into the causes which contribute toward this destruction of the structural integrity of the steel —data on track conditions, such as the actual fiber stresses which are realized under the weights of different types of locomotives and under the different wheels of those different engines in track in ordinary condition, and from the metallurgical end observations on steels of different degrees of hardness.

Will Sell Plants.—The numerous manufacturing plants of the Hardware & Wooden Ware Co. will be sold at receiver's sale, Feb. 21, under the authority of the United States district court. The plants to be sold on this date include the S. A. Smith Co., Brattleboro, Vt.; Wilkins Toy Co., Keene, N. H.; R. Bliss Mfg. Co., Pawtucket, R. I.; Jones & Bixler Mfg. Co., Bethlehem, Pa.; Gray Iron Casting Co., Mt. Joy, Pa.; F. W. Crandall Mfg. Co., Elkland, Pa.; Gong Bell Mfg. Co., East Hampton, Conn.; J. L. Watros Mfg. Co., East Hampton, Conn.; N. N. Hill Brass Co., East Hampton, Conn.; J. & E. Stevens Co., Cromwell, Conn.; East Kenton Hardware Mfg. Co., Kenton, O.; St. Louis Rattan Co., St. Louis; Parker, Winchendon & Whitney Reed Chair Co., Leominster.

COMPLETE REPORT

Of Great Northern Ore Lease Operations for Past Year.

The trustees of the Great Northern iron ore properties have made public their report covering the year ended Dec. 31, 1911, and this shows a surplus of $1,539,242, compared with a deficit in the preceding 12 months of $206,148. The large addition to the surplus account was due principally to the distribution of only $750,000 to certificate holders against $2,250,000 in the previous year.

A comparative summary of the financial statement of the past two years shows the following:

	1911.	1910.
Dividends	$2,365,434	$2,105,000
Interest, etc.	12,005	6,479
Total receipts	$2,377,439	$2,111,479
Expenses trustees	88,198	67,628
Balance	$2,280.241	$2,043,851
Distribution to certificate holders	750,000	2,250,000
Surplus	$1,539,242	*$206,148
Prev. surplus	32,831	238,979
Total surplus	$1,572,073	$32,831

*Deficit.

The report of the trustees which is given in pamphlet form for the first time goes considerably into detail regarding the lease on the properties, executed to the Great Western Mining Co., the subsidiary interest of the United States Steel Corporation, by which notice has been given for the cancellation of the tenure on Jan. 1, 1915. Touching upon the future of the properties beyond that time the report says that while this action will present questions for the decision of the trustees no general statement of future policy can be made at this time.

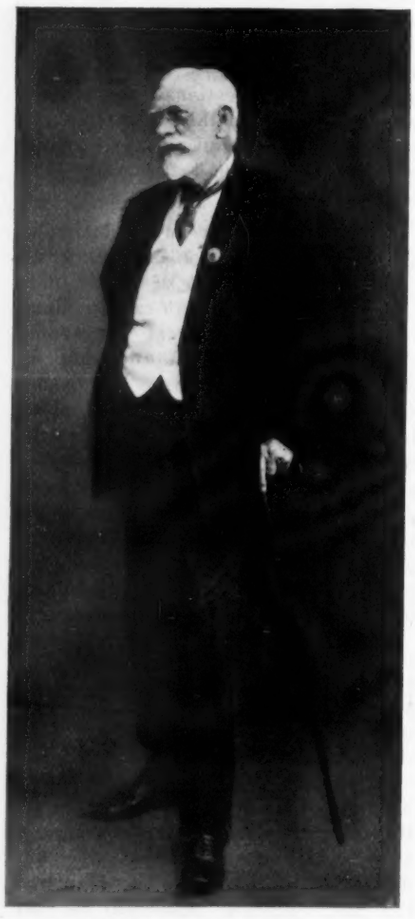
Continuing further in its reference to the lease to the Great Western Mining Co., the report says:

According to estimates of the Great Western Mining Co., as of Jan. 1, 1911, there were at that date contained in the various properties leased to it the following tonnages of iron ore: In lands owned in fee, 108,058,756 tons; in leaseholds of the first class, 108,236,283 tons; in leaseholds of the second class, 106,085,632 tons; total under lease to Great Western Mining Co., 322,380,671; in mines covered by the "old leases," according to records of the State Tax Commission as of May 1, 1911, 55,704,722; grand total, 408,085,393.

The lease with the Great Western Mining Co., the performance of which is guaranteed by the United States Steel Corporation, was finally executed in August, 1907. It covers 39,295.88 acres, as follows: Owned in fee, 19,933.81 acres; owned in fee jointly with others, of which 'The companies' proportion is 7,914.95 acres, 15,972.26 acres; held by lease, 3,389.81 acres; total, 39,295.88 acres. Of the fee lands 3,961.66 acres are owned by the North Star Iron Co., of which stock the trustees hold about 91 per cent.

A table, showing the operations under the Great Western Mining Co. lease over the entire period it has been in effect is subjoined to the report. This summary is as follows:

Year.	Tons Shipped.	Average %Iron.	Average Royalty*.	Royl. Rec'd. Incl. Fr'ght.
1907	137,270	-58.7641	$.838726	$225,020.07
1908	508	-65.1498	1.180295	1,005.95
1909	41,624	56.4001	0.792687	32,994.80
1910	2,046,970	56.9633	0.853830	2,854,379.52
1910	106,007	-49.00	0.30	110.378.95
1911	5,344,078	58.2148	0.945308	†8,591,830.70
1911	155,681	-49.00	0.30	155,450.51
	7,570,450	-57.8769	0.917818	$11,705.231.04
	261,688	-49.00	0.30	265,829.46
	7,832,138			$11,971.060.50
Interest earned on unapportioned minimum				156,184.24
Total royalty and fr'g't, as above				11,971,060.50
Grand total receipts from G. W. M. Co., with int. earn'gs.				$14,820,398.24



THOS. M. GALLAGHER

*The schedule price of ore shipped by the Great Western Mining Co. when hauled by the Great Northern Railway Co., includes delivery at Lake Superior, the rail freight being paid by the lessor companies. This freight has been 80 cents per ton, but on Dec. 1, 1911, was reduced to 60 cents per ton. No ore was shipped during the month of December, 1911. For convenience, the royalty rates above shown are net rates; that is, the royalty rate after deduction of freight.

†This amount includes, in addition to payments at the regular schedule rates for the required minimum shipments for the year 1911, the entire amount of the 1908 deficiency minimum and a portion of the 1909 deficiency minimum payments, which were absorbed by shipments of the Great Western Mining Company during 1911, together with $154,187.49 interest earned thereon.

Death of Thos. M. Gallagher

Thomas M. Gallagher, until recently vice president of the Scullin-Gallagher Iron & Steel Co., St. Louis, and a man of very strong personality, died at his home in Webster Groves, a suburb of St. Louis, Thursday evening, Feb. 1, aged 71. His death was the result of a nervous breakdown.

Mr. Gallagher was born in New Orleans and went to Cincinnati with his parents when he was two years old. He attended the public schools in Cincinnati, also St. Vincent college, removing to St. Louis in 1855 with his parents. His father was a blacksmith, and the young man assisted him in the shop. Early in the civil war he was employed by the United States government at the St. Louis arsenal. In 1862, he went to Jackson, Tenn., where he worked for the government on the Mobile & Ohio railroad. Six months later he was transferred to Columbus, Ky., as foreman of the Mobile & Ohio shops. He remained there until 1865. Returning to St. Louis in 1866, Mr. Gallagher entered the employ of Thomas Howard & Co., manufacturers. He was superintendent of the Southwestern Express Co., at Cincinnati, from 1867 to 1869. As foreman of the foundry of Shickle, Harrison & Co., he returned to St. Louis in 1869, later becoming a stockholder in the company. He was made superintendent and general manager of the plant in 1882, and vice president and general manager in 1895. From 1899 to 1910, he was vice president and general manager of the Scullin-Gallagher Iron & Steel Co., and was largely responsible for the growth of the concern.

Mr. Gallagher is survived by his widow, two sons—Thomas E. Gallagher, of St. Louis, and Andrew B. Gallagher, of Webster Groves, also two grandsons.

Will Make Rolled Steel Products

The Pioneer Iron & Steel Co., Sand Springs, Okla., has been incorporated with $75,000 capital by Benjamin F. Rice and C. B. Farquharson, of Tulsa, Okla., and J. H. Kerwin, Gary, Ind. The company will engage in the manufacture of rolled steel products. A building, 85 x 250 feet, will be erected. Samuel E. Light, formerly of Lebanon, Pa., is financially interested in the company.

Iron and Steel Securities

Transactions on the New York stock exchange last week were characterized by an abrupt decline in the middle of the week, followed by a partial rally. The decline came after the publication of the Steel Corporation's quarterly report Wednesday.

Monday, with the exception of a few prominent railway specialties, the list closed generally lower; grain markets were strong and higher; Berlin and Paris markets were weak on rumors of fresh political troubles. Tuesday, the market was less active and prices were firmer and closed higher; foreign markets were firmer and closed higher. Wednesday, Steel common broke to 59¾ and the entire list settled to a lower level; foreign security markets were firmer. Thursday, the market was active, and after a period of new low prices on the movement, turned stronger and closed higher. Friday, trading was less active and prices moved within a narrower range; gold to the amount of $2,000,000 was engaged for export to Paris, the first transaction of this nature for several years. Saturday, stocks were less active and closed with a heavy tone.

Money on call ranged between 2⅜ and 1¼ per cent. Time money was freely obtainable but the continued ease in call loans diminished the demand. The actual condition of clearing house institutions showed loans increased $24,145,000; net deposits increased $17,550,000; total reserve, $476,830,000, and the excess of reserve $40,775,850, a decrease of $7,987,200. Non-member banks and trust companies showed loans decreased $3,752,100; net deposits decreased $4,684,700; reserve on deposits decreased $344,500, and the percentage of reserve 19.9, against 19.8 the previous week. Bank clearings showed an increase from the preceding week and a slight decrease from the corresponding week a year ago. Commercial failures numbered 368, compared with 415 the preceding week and 342 the corresponding week last year. Shares were sold to the number of 3,630,593, compared with 2,255,300 the preceding week and 3,964,700 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $17,961,000, compared with $29,053,000 the preceding week and $14,608,000 the corresponding week last year.

	Clos'g Quo. Feb. 3	Changes in week.	Annual Meeting date	1912	Stock Outstanding	Basis.	Dividend Last Dividend	Dividend Date Last Div. Pay
Allis-Chalmers	1	— ¼			$19,820,000		.....	
Allis-Chalmers, pr	7⅞	— ⅛			16,050,000	7 cum.	1¾ Q.	Feb., 1904
American Can	11½	— ½	Feb.	6	41,233,300		.....	
American Can, pr	91⅛	— ½			41,233,300	7 cum.	1¼ Q.	Jan., 1912
Am. Car & Fdy	50¾	— ½	June	27	30,000,000	2	½ Q.	Jan., 1912
Am. Car & Fdy., pr	115¾	— ⅛			30,000,000	7 n. c.	1¾ Q.	Jan., 1912
American Loc	33½	—1½	Oct.	15	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr	103	— ¾			25,000,000	7 cum.	1¾ Q.	Jan., 1912
American Ship	50	.....	Oct.	9	7,600,000	4	2 Q.**	June, 1911
American Ship, pr	103	— ¼			7,900,000	7 n. c.	1¾ Q.	Jan., 1912
Am. Steel Foundries	29	—1	Mar.	21	17,184,000	5	1¼ Q.	May, 1911
Barney & Smith	10	.....	June	4	2,000,000	4	1 Q.	Dec., 1907
Barney & Smith, pr	80	.....			2,500,000	8 cum.	2 Q.	Dec., 1911
Bethlehem Steel	31⅞	.....	April	2	14,862,000		.....	
Bethlehem Steel, pr	61	+ ½			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	42¾	— ¾	Mar.	19	45,000,000*	5	1¼ Q.	Feb., 1912
Cambria Iron	44¾	+ ¾			8,468,000*	4	2 S. A.	Oct., 1911
Chicago Pneumatic Tool	48¾	—1¼	Feb.	19	6,448,800	4	1 Q.	Jan., 1912
Colorado Fuel	26	— ¼	Oct.	21	34,235,500		1¾ Q.	April, 1902
Crucible Steel	113¾	— ¼	Nov.	15	24,578,400		.....	
Crucible Steel, pr	81½	— ⅜			25,000,000	7 cum.	1¾ Q.	Dec., 1911
Empire Steel	10	.....	Feb.	28	1,254,770		.....	
Empire Steel, pr	36	.....			2,500,000	6 cum.	2 S. A.	July 1911
Fay & Egan	70	.....	Feb.	20	1,000,000	7	1¾ Q.	Nov. 1908
Fay & Egan, pr	110	.....			1,000,000	7 cum.	1¾ Q.	Nov., 1911
General Electric	157	—1	May	14	77,281,200	8	2 Q.	Jan., 1912
Harbison-Walker	40	.....	Jan.	15	18,000,000	2	½ Q.	Dec., 1911
Harbison-Walker, pr	100	.....			9,600,000	6 cum.	1½ Q.	Jan., 1912
International Pump	30	—1¼	Dec.	10	17,762,500		½ Q.	Apr., 1905
International Pump, pr	79	—2			11,350,000	6 cum.	1½ Q.	Feb., 1912
Lackawanna Steel	30	.....	Mar.	13	34,978,000		.....	
Lake Sup. Corp	28	.....	Oct.	2	40,000,000		.....	
New York Air Brake	54⅞	—1⅛	Mar.	13	10,000,000	6	1½ Q.	July, 1911
Niles-Bement-Pond	95	.....	Feb.	7	8,500,000	6	1½ Q.	Dec., 1911
Niles-Bement-Pond, pr	104	.....			2,000,000	6 cum.	1½ Q.	Nov., 1911
Otis Elevator Co	70	—1	Mar.	18	6,358,600	4	1 Q.	Jan., 1912
Otis Elevator Co., pr	100½	+ ½			6,375,300	6 n. c.	1½ Q.	Jan., 1912
Pa. Steel	60	.....	May	13	10,750,000		.....	
Pa. Steel, pr	100	— ½			20,587,500	7 n. c.	3½ S. A.	Nov., 1911
Pittsburgh Coal	18	.....	Mar.	12	28,104,600		.....	
Pittsburgh Coal, pr	80	— ⅜			27,071,800	7 cum.	1¼ Q.	Jan., 1912
Pittsburgh Steel Co., pr	103	+1	Oct.	7	7,000,000	7 cum.	1¾ Q.	Dec., 1911
Pressed Steel Car	30	—2½	Feb.	21	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr	100½	+ ⅜			12,500,000	7 n. c.	1¾ Q.	Feb., 1912
Pullman	158½	—1½	Nov.	13	120,000,000	8	2 Q.	Feb., 1912
Railway Stl. Spring	29	—1	Mar.	7	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	100½	— ½			13,500,000	7 cum.	1¾ Q.	Dec., 1911
Rep. Iron & Steel	22⅞	—1⅜	Oct.	16	27,191,000		.....	
Rep. Iron & Steel, pr	79¼	—3¼			25,000,000	7 cum.	1¾ Q.	Jan., 1912
Sloss-Sheffield	39¼	—1¾	Mar.	13	10,000,000	5	1¼ Q.	Sept., 1910
Sloss-Sheffield, pr	112	.....			6,700,000	7 n. c.	1¾ Q.	Jan., 1912
U. S. Pipe & Fdy. Co	16	.....	June	26	12,500,000		1 Q.	Dec., 1907
U. S. Pipe & Fdy. Co., pr	50⅛	— ⅞			12,500,000		1¾ Q.	June, 1911
U. S. Steel	60¼	—4⅛	April	15	508,302,500	5	1¼ Q.	Mar., 1912
U. S. Steel, pr	110½	— ½			360,281,100	7 cum.	1¾ Q.	Feb., 1912
U. S. Steel 5s	103⅜	— ⅝			465,189,500	5	.....	
Va. Iron, Coal & Coke	67¾	— ¼	Sept.	17	9,073,680		5. †	Oct., 1907
Westinghouse Air Brake	158	+1½	Oct.	1	14,000,000*		5 Q.‡	Jan., 1912
Westinghouse Electric	70⅛	— ⅞	June	12	3,998,700*	7 cum.	1¾ Q.	Jan., 1912

Par value of shares, $100, except those starred (*), $50.
**Includes last 1 per cent payment of 4 per cent extra.
†Stock.
‡Includes 2½ regular, 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 60¾, a net loss of 2.

Boston.—Butte Coalition closed 21⅞, a net loss of ⅜; Calumet & Arizona closed 58½, a net loss of 3; Calumet & Hecla closed 410, a net loss of 15; North Butte Mining closed 25, a net gain of ⅝; Quincy Mining closed 74, a net loss of 1.

Financial Notes.

The Cleveland Metal Products Co., Cleveland, has increased its capital stock from $200,000 to $1,000,000.

The International Harvester Co. has declared the regular quarterly dividend of 1¾ per cent on its preferred stock, payable March 1.

The American Radiator Co., Chicago, has declared the regular quarterly dividend of 2 per cent, an extra dividend of 2 per cent and 10 per cent on common stock, all payable March 30; also the regular quarterly dividend of 1¾ per cent on preferred stock, payable Feb. 15.

THE IRON TRADE REVIEW

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Cleveland, February 8, 1912

Cause of the Manchester Wreck

Startling conclusions adduced from an exhaustive examination of the broken rail which caused the Lehigh Valley railroad wreck near Manchester, N. Y., are contained in a report submitted to the Interstate Commerce Commission, by the eminent engineer-physicist of the Bureau of Standards, James E. Howard. His statement to the effect that current railroad practice in the use of hard steel rails and high wheel pressures has nearly or quite reached the limit of endurance of the metal of the roadway is in line with the recent testimony of James A. Farrell, president of the United States Corporation, before the Stanley committee. Mr. Farrell said that beginning about 1890, the railroads of the United States began asking for higher carbon in steel rails to secure great wear and that the railmakers unwisely, and many times under protest, made the quality of steel demanded. As a result of the continued demand by the railroads for a higher carbon content, Mr. Farrell expressed the opinion that rail steel, today, is within the danger zone of brittleness. That the railmaker or makers cannot be held responsible is pointed out in another statement made by Mr. Howard, which follows: "It is not a question of mill practice in the manufacture of steel, further than that the mills are making the steel which they are required to make under the specifications given them."

The problem of safe railroad transportation is evidently up to the railroads. To minimize breakage, they must be prepared to face a greater wear on steel rails and as safety is the first consideration, a softer steel with a lower carbon content is essential. A heavier rail, made of softer steel than now specified, may greatly reduce the rapidity of wear now anticipated by railroad engineers.

The Pig Iron Statistics

The official statistics of pig iron production in the United States in 1911, as made public last week by the American Iron and Steel Association, confirm the statement as compiled from the monthly reports of coke and anthracite production made to THE IRON TRADE REVIEW. Charcoal iron production, which is not thus reported, is returned to the American Iron and Steel Association at 117,541 tons for the second half of the year, the decrease from 161,135 tons in the first half being rather unexpected. The year's production of charcoal iron was 278,676 tons, while the production of all grades was 23,649,344 gross tons. Thus 1911 yields precedence to 1906, 1907, 1909 and 1910.

It is impossible to determine at this time whether the production of 1911 was abnormally low or the production of certain preceding years abnormally high. We have the following showing:

1880.....	3,835,191	1906.....	25,307,191
1885.....	4,044,526	1907.....	25,781,361
1890.....	9,202,703	1908.....	15,936,018
1895.....	9,446,308	1909.....	25,795,471
1900.....	13,789,242	1910.....	27,303,567
1905.....	22,992,380	1911.....	23,649,344

Had it not been for the remarkable rise in production culminating in 1905-6-7, the production in 1910 and 1911 would have appeared quite natural, bearing out fairly well the average increase which obtained in the past. The 1910 production, for example, was almost double that of 1900, showing a much greater percentage increase from 1900 to 1910 than there was from 1890 to 1900. Inasmuch, however, as 25,000,000 tons was exceeded as early as 1906, even the 1910 production appeared poor, and the 1911 production, of course, suffers still more by comparison.

A study of all the statistics of production of pig iron has conclusively shown this, that summing up the production of all decades, and starting the decades at any point at all, there is a steady rate of progression from one decade to the next. If a few years run ahead, a few other years will run behind, and these variations are swallowed up in the total of ten-year periods, however they are selected.

The changes in production of different grades from 1910 to 1911 were what would have been expected. While the total production decreased 13 per cent, Bessemer decreased by a larger percentage, about 16 per cent, and basic by a smaller percentage, about 6 per cent. Thus basic continued to gain relative to Bessemer. The production of other grades, chiefly foundry iron, decreased more than steel making iron, but the fact that merchant furnaces and consumers accumulated stocks of foundry iron in 1910 and reduced them in 1911 fully covers the variation in production. The consumption of foundry pig iron in 1911 was undoubtedly as good, compared with 1910, as was the consumption of steel making iron.

The Little Fellows

One of the most striking features of the agitation of recent years has been the tendency to complain about big things, largely because they are big. In a letter to the editor of THE IRON TRADE REVIEW, dated Sept. 8, 1906, William J. Bryan said he would not transact business with a company having control of more than 50 per cent of the production of any article and since that time there has been an immense amount of talk about the sins of big business. Of course, there was foundation for some of the complaints, but some of the saner men of the country are calling attention to the fact that it is not only big business which is sometimes a sinner. "I tell you," said Governor Harmon the other day, to a representative of *The Outlook*, "the people of this country are tired of special privileges and they are just as tired

of it for the little chap as for the big fellow." Referring to his experience in the office of chief executive of Ohio, the governor said: "There is a lot of prating about special privileges for the big fellow, but once you get in a place like this, you find out there are a lot of little fellows who want special privileges for themselves, and they come to you to get them."

For a time it seemed almost as if the agitation against big business would continue until no one would dare look his neighbor in the face unless he were engaged in some little business. There are still a good many people who think that the salvation of the country demands a breaking-up of big concerns into little ones. They are the agitators for disintegration. The sounder, better sentiment, however, demands that people be allowed to build up their business to as great an extent as they can, provided only that they do not intrude upon the rights of their neighbors.

President Palmer's Answer

Probably many who carefully read and studied the answer of the United States Steel Corporation to the government suit, as published in full in the last issue of THE IRON TRADE REVIEW, reached the conclusion that the frank confession that the American Steel & Wire Co. was a member of the wire rope association and of similar associations, constituted one of the most vulnerable points in the defense of the Steel Corporation. It might be said that the Steel Corporation had no right to plead ignorance of the doings of one of its children because it was the duty of the parent to know what the child was doing. The answer of President Palmer, published in full in our issue today, presents this matter in a very different light, for it shows that he acted within what he believed to be clearly his legal rights in permitting the company to become a member of the associations, and it also shows how small were the products affected by the associations, as compared with the entire product of the American Steel & Wire Co. It appears that products forming only about 3 per cent in tonnage and 10 per cent in cost were in any way influenced by the associations.

The government will hardly disrupt a great corporation on account of membership in associations affecting so small a percentage of the product of one of its subsidiaries, when the president and other officers of that subsidiary have been fined for having held such membership. If any wrong was committed, sufficient penalty has already been imposed. The fact is that President Palmer never would have pleaded guilty and that he and others allowed the plea of nollo contendere to be entered on account of a feeling of compassion for some other defendants who, although not guilty, were not able, for various reasons, to put up the fight which would have been necessary to secure acquittal in the courts. The action of the American Steel & Wire Co. officials was thoroughly creditable and it was unselfish to an unusual degree.

"Dissolution a Delusion"

(GEORGE W. PERKINS, *in an Address before the Traffic Club, New York.*)

"There is no logical connection between the evils that have existed in our large industrial concerns and the remedies that the government is trying to apply. In place of regulation we are given segregation, and are told that dissolution is the solution, while every practical man knows that dissolution is a mere delusion. Government regulation is all right, but government repression is all wrong."

Tremendous Demand for Ships

There is now prevailing, and in fact has been prevailing for many months, and is likely to continue for many more, a most curious commercial phenomenon which practical men are unable to explain, but which economists analyze as one of the pronounced symptoms of recovery from sustained depression—that is, the tremendous oversea interchange of the world's goods. The increase in the volume of shipping between the ports of all nations has grown to proportions without precedent in the history of commerce. More and larger ships are carrying goods upon the high seas today than have ever been so engaged. The demand for cargo space of any character is too great for comparison with any other period, and the rate for the transport of freight from country to country or from different ports in the same country are at record figures. Vessels for time charter are very scarce. For the ship broker the period is one of stress and for the ship owner it is the best season in history.

There has never been such a period of maritime activity hitherto. Economists show that in 1881 and in 1896 similar movements were experienced, but nothing in volume comparable to the present. In 1896, following the long period of depression, which started in 1893, vessels began to move goods freely, though corresponding activity on land was somewhat later in arriving.

The economist points to this movement as the surest harbinger of a general commercial revival of a permanent character. If general prosperity follows in corresponding proportions to the movement of ocean goods, the world is booked for a wonderful revival. Ship brokers are frank to say that they have never seen a condition remotely resembling the present one, and there is no one in the business old enough to remember any comparable state of affairs. The improvement was noticeable as early as September, 1910, but it was not until 1911 was well upon its way that it reached an extraordinary volume. The astonishing thing about it is that it is constantly growing, each succeeding month since September, 1910, being greater than its predecessor, until at the present time the movement is simply stupendous. Nor is the movement localized. Cargo space is just as difficult to get in the Far East as it is in New York. It is quite as notable in Australia as it is in Great Britain. Ships are in demand everywhere. The volume of freight moved is estimated as being three times that following the period of revival which began in 1881. Not only are more ships employed, but the ships are larger and faster. As for the ship owner in the coastwise trade of the United States, he is reaping his harvest. Ships that a year ago could be chartered for $6,000 a month now demand $10,000 and are getting it. Notwithstanding the volume, the ships appear to be handling the freight promptly, congestion being reported only from Panama, where the dock facilities are absurdly inadequate to the freight offered for transit.

Meanwhile the ship yards are filling up with orders and some of the yards on the Atlantic seaboard cannot promise delivery under two years.

Individual Answers in Steel Corporation Suit

Filed by the Rockefellers, Carnegie, Converse and Palmer—

Explanation of Valuation of Properties of the Carnegie Steel Co.

Andrew Carnegie, John D. Rockefeller and son, John D. Jr., E. C. Converse and W. P. Palmer, defendants in the suit brought by the government against the United States Steel Corporation, have filed separate answers.

Andrew Carnegie, in his answer, denies any past, present or intended action in violation of the anti-trust act, or in restraint of trade, but adds that he has no knowledge to enable him to answer the government allegations relating to companies other than the Carnegie company, though he does not admit them. He denies that the purpose and effect of the absorption of the Duquesne Steel Works was a combination in restraint of trade, and insists that the purpose was solely to get greater industrial efficiency, and that the corporations and associations consolidated in the Carnegie company were not competing companies. He denies that he or the Carnegie company had ambitious plans involving further elimination of competition and restraint of trade.

The Dispute with Frick

Concerning the sale of the Carnegie company to the Steel Corporation, Mr. Carnegie insists that while it was true that he was "aware of the formation of the United States Steel Corporation and the business which it proposed to conduct," he did not combine in any of the proposed plans further than to agree to sell his majority stock of the Carnegie company outright, taking in pay therefor bonds of the Steel Corporation, to be secured by a pledge of stocks and other securities owned or to be owned by the Corporation.

"Having agreed to make this sale," the answer says, "he took no part in the plans for the organization of the Corporation, nor has he taken any part either direct or advisory in its business, his position being solely that of a creditor holding obligations of the Corporation." Of the capitalization and terms of issue thereof, he says, he has only a general knowledge derived from publications on the subject.

Mr. Carnegie denies the allegation that the value of the tangible properties of the Carnegie company did not exceed $160,000,000 at the time of its sale to the Corporation, and that the net value of its assets on Dec. 31, 1899, was $75,610,104. The allegation in the petition that a statement from the books of the Carnegie Steel Co. to this effect was verified by him and other members of the company under oath, he says, refers to an answer to a bill filed in the court of common pleas of Allegheny county, Pa., by H. C. Frick, to compel an accounting for his interest in the Carnegie Steel Co., Ltd., "a partnership association existing prior to the organization of the Carnegie company, the corporation referred to in the present petition." He adds that he and other defendants at the time disputed Frick's estimate of the assets of the partnership as more than $250,000,000, because the association, though worth as a going concern far more than its book value, did not have at that time tangible assets which it could sell or transfer for that value.

The real question in that early suit as to the value of the property, he says, was based on "a certain agreement between the members of the association, by which its assets, as between the members, were to be estimated and appraised in a certain way for the purpose of fixing the value of the interests, both of incoming and outgoing members." By that appraisement, he says, "assented to by the members of the association, including H. C. Frick, the value of the assets was fixed as stated in the petition in this case." Mr. Carnegie declares that he has no knowledge and, therefore, cannot admit or deny the averment of the petition that H. C. Frick proposed to sell the Carnegie property to J. P. Morgan for $160,000,000, and that the latter declined on the ground that the price was too high. The only option Frick had on the property of the Carnegie company, he says, was one involving the payment to Carnegie of $157,950,000 for his interest alone.

"Further answering this paragraph," continues Mr. Carnegie, "this defendant says that his sole motive in agreeing to the sale of the properties of the Carnegie company to the United States Steel Corporation was his desire to retire from the hazards and responsibilities of active business, and that since said sale was concluded he has had no connection with the business of the purchasing Corporation or any one else."

John D. Rockefeller's Answer

John D. Rockefeller, in his answer, sets forth a similar defense as to violation of the anti-trust act. "His sole relation to the Steel Corporation," his answer sets forth, "was to sell to it certain property, save as he was an elected but not active director for a limited period"—from April 6, 1901, to Feb. 2, 1904. His only connection with the Corporation, he says, was his sale of the Bessemer Steamship Co.'s lake fleet to the Corporation for cash, and the sale of his interest, nearly the whole, in the Lake Superior Consolidated Iron Mines, which owned extensive iron mines in Minnesota.

The answer of John D. Rockefeller

Important Assertions By Defendants

By Andrew Carnegie.

That the real question in the Frick litigation as to the value of the Carnegie Steel Co.'s property was based on a certain agreement between the members of the firm by which its assets were to be estimated in a certain way for the purpose of fixing the value of the interests of both incoming and outgoing members.

By Edmund C. Converse.

That the Steel Corporation's capitalization is not in excess of the real value of its properties.

That there is no basis for the charge that the profits have been so high as to indicate a monopoly.

By President Palmer.

That the Wire Rope Association and similar associations were legal according to advice given to the sales department of the American Steel & Wire Co., and the agreements were entered into with no intention to violate any law or statute.

That products complained of by the government as being influenced by agreements have amounted to between 2 and 3 per cent of the tonnage of the American Steel & Wire Co., and between 10 and 13 per cent of the value of the products sold annually by that company.

Jr. follows substantially that of his father.

The answer of Edmund C. Converse, a director of the Steel Corporation and former president of the National Tube Co., declares that competition in the steel industry, far from being suppressed, has increased since the formation of the Corporation, so that the business done by the Corporation is now less than 50 per cent of the country's steel business. He denies that there has been or is any system of interlocking directorates or financial alliances to control the steel industry or to extend the influence or power of the Steel Corporation over trade or commerce, or that the Corporation has ever sought, held, or exercised control over consumers or competitors. The ore purchases it made, he says, were for its present or future needs only, and he adds that there are ore supplies of good quality and enormous quantity open to all in this country. He denies that the Steel Corporation's capitalization is in excess of the real values of its properties, and says there is no basis for the government's charge that the profits of the Corporation have been so high as to indicate the existence of a monopoly.

Mr. Palmer's Answer

Mr. Palmer's answer in full follows:

This defendant, William P. Palmer, for answer to so much of the petition exhibited against the defendants by the above-named petitioner as he is advised it is material or necessary for him to make answer unto, says:

1st. In January, 1899, this defendant became a director and general manager of the American Steel & Wire Co., taking charge of the operation of the property and having charge of forming the active working organization; that on May 10, 1900, he was elected president of the American Steel & Wire Co. and has since continued to act as such president; that in 1901, all stockholders of the American Steel & Wire Co. were offered an opportunity to sell their stock to the United States Steel Corporation; that a committee was appointed on behalf of the stockholders of the American Steel & Wire Co. to consider and report upon what terms it would be for the interests of such stockholders to make sale of their stock to the United States Steel Corporation; that this answering defendant was not a member of said committee, but, upon said committee's making report, this defendant acquiesced therein and sold substantially all the stock held by him in the American Steel & Wire Co. to the United States Steel Corporation.

2nd. That from the time of his election as president of the American Steel & Wire Co., in May, 1900, until the present time, he has had charge and control, with his associates, of the management and operations carried on by said company, reporting results from time to time to the United States Steel Corporation or its proper officers.

3rd. This defendant says that the American Steel & Wire Co. has and does manufacture, among other articles, horse shoes, bare copper wire, wire rope iron and steel, rubber insulated cable, paper insulated cable and insulated wires; that said products have amounted (for the past five years) to between 2 and 3 per cent of the tonnage annually manufactured and sold by the American Steel & Wire Co., and, being high-priced products and difficult to manufacture, have amounted to between 10 and 13 per cent of the value of the products sold annually by the American Steel & Wire Co.

This defendant admits that in July, 1908, the sales department of the American Steel & Wire Co., with his approval and consent, did, as set forth in the petition of the complainant, enter into certain agreements designated in the petition as "the Wire Rope Association," "the Rubber Covered Wire Association," "the Horse Shoe Manufacturers' Association," "the Underground Power Cable Association," "the Weatherproof and Magnet Wire Association," "the Lead Incased Rubber Cable Association," and "the Bare Copper Wire Association," all of which associations had reference to some portions of the products included in the six divisions of products hereinbefore enumerated.

This defendant says that during the existence of said associations they had reference to nothing except what is included in the six divisions hereinbefore enumerated of the manufactured products of the American Steel & Wire Co.; that at no time did the tonnage and value of all of the articles in the aforesaid six classifications exceed the percentage as hereinbefore enumerated, and that during all of said time, as to more than 97 per cent of its tonnage and more than 87 per cent of the value of its products, the American Steel & Wire Co. was wholly free in its manufacture and markets.

That early in the year 1909, the United States Steel Corporation learned of the then existence of the aforesaid agreements of the American Steel & Wire Co., and requested the American Steel & Wire Co. to immediately withdraw from all such agreements, which request was at once complied with, and no such agreements have been continued or entered into since such withdrawal.

With reference to said agreements and the time they existed, as set forth in the petition of complainant, this defendant says that the sales department of the American Steel & Wire Co. was advised that the agreements entered into were legal and not in contravention of law; that they were originated and conducted under the advice of reputable attorneys in good standing, and with no intention of violating any law or statute, and that this defendant, in consenting to their organization and conduct, did not do it with any intention of restraining trade or commerce in any case, but for the purpose of affording reasonable regulation and protection to the American Steel & Wire Co., and to other corporations and persons engaged in similar lines of business, in such manner that such regulation would not alone be beneficial to the producer, but would be beneficial and protective to the purchasers; that this defendant believed and still believes that said agreements as he understood them were made along fair, economic, business lines; that they were not made to and did not fix arbitrary, artificial and non-competitive prices which were greatly in excess of those which would have been obtained but for such combinations; that they did not unlawfully limit production; neither did they unlawfully destroy and prevent competition or in any manner injure the business, trade or commerce in the United States in the articles referred to in said agreements, and, on the contrary, they were intended to and did seek to regulate to a reasonable extent only the production and price, but in such a manner as to develop and promote trade and protect the interests of the manufacturer and the purchaser.

This defendant denies that any of said agreements during the time of their existence were a combination in restraint of trade or commerce among the several states and with foreign nations within the meaning of Section 1, or an attempt to monopolize and a monopolization of part of the trade or commerce among the several states or with foreign nations within the meaning of Section 2 of the anti-trust act; on the contrary, the purpose and intention of this defendant in consenting to and allowing such pools and agreements was as herein-above set forth.

This defendant alleges that the business in the iron and steel industry, including the business of the American Steel & Wire Co., depends, for the amount of its production and sales and the prices obtained therefor, upon the law of demand and supply for such products throughout the United States and in foreign countries, and that the variation in prices is at all times regulated by such demand and supply, and that the aforesaid agreements when they existed acted as regulators, preventing excessively low, ruinous prices and excessively high prices, and that in no wise were they intended to operate in restrain of trade or commerce, but for the purpose of creating, enlarging and steadying trade and commerce in the lines covered by such agreements.

This defendant denies all unlawful combination and confederacy charged against him in the petition of complainant.

This defendant, having fully answered all the matters in said petition material to be answered by him, prays this Honorable Court that he be dismissed with his reasonable costs and charges.

JOHN Z. B. WICOFF,
Solicitor for answering defendant.
Andrew Squire,
Of counsel.

General Denial by Ore Trustees

Answers denying that they had been parties to any undue restraint of trade through the leasing of ore lands to the Great Western Mining Co., a subsidiary of the United States Steel Corporation, as charged by the government in its suit for dissolution of the latter inter-

est, were filed at Trenton, N. J., Jan. 29, by the West Messabi Land Co., Ltd., and 17 other land and iron mining companies in Minnesota, by J. H. Gluber, individually and by Louis W. Hill, Jas. N. Hill, Walter J. Hill and Edward T. Nichols, as trustees of the Great Northern ore properties. The land companies admit the leases, but claim they were made in good faith for the benefit of the stockholders, without any purpose of creating a monopoly. The trustees of the Great Northern ore properties deny that they became parties to the lease with the intent of preventing the ore from being mined and sold to the independents. They deny that the practical effect of the lease was to forestall competition or to increase to any undue or improper extent the United States Steel Corporation's control of the ore resources of the country or to destroy competition in iron ore. They deny that the royalty agreed to be paid was unprecedently large or in excess of the true value of the considerations granted by the lease. They deny that they are in any way associated with the United States Steel Corporation as officers or through any system of interlacing or interlocking of directorates.

A. S. M. E.

Will Hold Spring Meeting in Cleveland—Dinner for Mr. Rice.

Calvin W. Rice, of New York, secretary of the American Society of Mechanical Engineers, was entertained on Thursday evening of last week by the Cleveland members of that organization. A dinner was given at the Chamber of Commerce by Ambrose Swasey, of Cleveland, at which Mr. Rice was the guest of honor. He was on the final lap of a tour that embraced the greater portion of the western and middle western states. During the trip, he has visited the majority of universities and technical schools throughout that territory.

The spring meeting of the American Society of Mechanical Engineers will be held in Cleveland from June 4 to 7. It will be the first time in 29 years that Cleveland has entertained the society and the Cleveland members will endeavor to make the meeting a notable one. The annual meeting of the Society will be held in New York in November.

The Southern Foundry & Machine Co., Lexington, Tenn., which was recently incorporated with $10,000 capital stock, will begin operations in the near future. A. E. Beasley, C. G. Gathings, T. A. Lancaster and others are interested.

RATE IS LOWERED

On Birmingham Pig Iron by Railroad to Pacific Coast.

A new freight tariff to the Pacific coast will go into effect in the Birmingham district on March 11. It means the placing of that territory on an equal shipping basis to the coast with all Mississippi river points, including Memphis and Cincinnati.

The reduction was given voluntarily by the railroads and without appeal to the interstate commerce commission. Those concerned in issuing the new tariffs are the Louisville & Nashville, the Frisco system, the Alabama Great Southern, the Illinois Central, the Mobile & Ohio and the Nashville, Chattanooga & St. Louis.

"The reduction includes all classes of freight," said J. T. Slatter, manager of the freight bureau of the Merchants' and Manufacturers' Association, in announcing the rate revision. "It means that Birmingham will have the opportunity to compete with the large cities along the Mississippi. Birmingham is now treated as a basing point for freight tariffs."

The commodities most affected by the rate change are pig iron, cast iron pipe, coke, cotton and rail fastenings. The Frisco lines have compiled a table on the rate changes which has been announced to shippers. According to this table the new rate on pig iron to California points is increased 8 cents a ton, while to the north Pacific points the new rate is $1.98 a ton lower. The north Pacific rate on coke is unchanged, but the California rate is increased $1.50 a ton. The table follows:

	California		North Pacific	
	New	Old	New	Old
Commodity.	Rate.	Rate.	Rate.	Rate.
Pig iron	$10.08	$10.00	$ 8.96	$10.94
Cast iron pipe..	13.00	13.00	13.00	13.00
Coke	9.50	8.00	9.50	9.50
Cotton	.95	1.36	.95	1.36
Rail fastenings .	.67½	.80½	.67½	.80½

Briquetting Flue Dust in Belgium

The Cockerill Works, at Seraing, which installed the first Schumacher plant for briquetting flue dust in Belgium several years ago, are now binding 25 per cent of coke breezes with their flue dust. Thereby they obtain considerable economy in their blast furnace operations, since coke breezes, thus introduced into briquettes, will act like lump coke and displace an equal amount of expensive coke in the burden. Several other large Belgium iron and steel companies are now following the initiative of the Cockerill Works, by installing the Schumacher process, said process being quite generally introduced in Europe for the briquetting of flue dust.

Sulphur in Chilled Cast Iron Car Wheels

Editor THE IRON TRADE REVIEW:

Referring to Mr. Gerhauser's communication in the number of Dec. 21, 1911, page 1090, and Mr. Outerbridge's reply in the number of Jan. 11, page 160, also to Mr. Gerhauser's answer in the number of Feb. 1, page 316. For Mr. Outerbridge's further information we have pieces of flanges of four car wheels sent us for analysis and one of our chemists found the following:

Car Wheel.	Silicon.	Manganese.	Sulphur.	Phosphorus.	Combined carbon.	Graphite carbon.	Total carbon.
A	0.73	0.46	0.120	0.320	0.46	2.70	3.16
B	0.73	0.48	0.140	0.390	0.50	2.60	3.10
C1	0.70	0.57	0.210	0.400	0.79	2.51	3.30
C2	0.59	0.53	0.178	0.262	1.21	2.49	3.70

A wheel manufacturer of many years experience states that as far as his own knowledge extends the range of chemical contents of all makes is about as follows:

Silicon	0.46	to 1.00
Manganese	0.18	to 0.80
Sulphur	0.089	to 0.236
Phosphorus	0.24	to 0.52
Combined carbon	0.50	to 1.58

A car wheel manufacturer of even greater experience has been quoted as stating that he has found car wheels to have a sulphur content as high as 0.25.

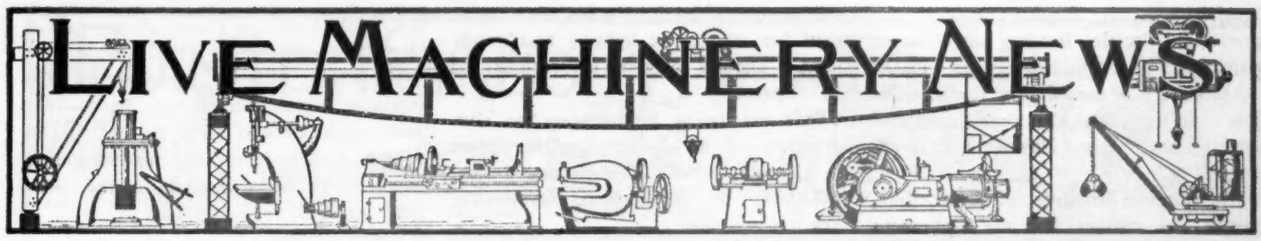
I would call to Mr. Outerbridge's attention in the proceedings of the Master Car Builders Association, vol. 43, 1909, the "Report of the Association of Manufacturers of Chilled Car Wheels with Reference to Weights and Wheel Designs," page 204, which states, "Knowing that there are millions of wheels in service in which the sulphur will average 0.15, the chances are that any wheel which may happen to fail is very likely to have a percentage of sulphur at least equal to that average."

I think if Mr. Outerbridge's communication to you were to be reread by your subscribers and compared with the official statement of the car wheel manufacturers, other comments would be unnecessary.

WM. WILKINS,
Gen. Supt. Iron Dept.,
Lake Superior Iron & Chemical Co.
Detroit, Feb. 1, 1912.

Will Sell Charcoal Iron.—Rogers, Brown & Co. have been appointed agents for the sale of warm blast charcoal iron manufactured by the Muirkirk Furnace, at Muirkirk, Md. This iron is of a quality especially adapted for the manufacture of ingot molds, locomotive castings, car wheels, chilled rolls, etc.

The Brightman Hammered Nut & Mfg. Co., Sandusky, O., has changed its name to the Brightman Nut & Mfg. Co.



Machine Tools

J. B. Boyd plans the establishment of a machine shop at Allensville, Ky. Equipment for woodworking will also be installed. The estimated cost of the plant is $6,000.

The Pullman Co. is planning the installation of some new machinery in its steel car building shops at the Pullman, Ill., plant. No details have yet been given out.

We are advised by the Gundlach Machinery Co., Belleville, Ill., that it is in the market for a large second-hand lathe with a swing of about 36 inches.

Machine tools will be needed by the Rocky Mount Machine Works, Rocky Mount, N. C., which has been organized with $50,000 capital stock by L. F. Pearsall, S. F. Jenkins and T. P. Jenkins.

The Gibbes Machine Co., Columbia, S. C., is in the market for machine tools and other equipment. It will begin work at once in the direction of rebuilding its plant, which was recently burned.

The Chicago & Alton railroad closed last week for a large number of machine tools for installation at its various shops. Joseph T. Ryerson & Son, Chicago, were awarded the majority of this business.

The Hoosier City Boiler Mfg. Co., incorporated at Indianapolis with a capital of $100,000, to manufacture boilers, tanks, etc., is in the market for punch presses, shears, rolls and plate-handling machinery. James M. Broucher and J. O. Stephenson, of Indianapolis, are the principal stockholders.

Water Works

The city of Burns, Ore., plans for the installation of a modern water and sewerage system.

A new water system for the town of Wray, Colo., is proposed at an estimated cost of $60,000. Thomas S. Shepperd, Denver, is preparing the plans.

The city of Fullerton, Cal., will soon vote on bonds for $100,000, for the installation of a municipal water and sewage system. Sloan & Robson, San Francisco, are the engineers.

The Oakdale Irrigation Co., Fresno, Cal., announces that contract will be awarded for the construction of an irrigation system along the Stanislaus river, from Oakdale to Riverbank, to the Utah Construction Co., costing about $1,000,000.

The city council of South Bend, Ind., has authorized an appropriation of $200,000 to be expended for improvements to the water works. Two 5,000,000-gallon pumps will be purchased at an estimated cost of $36,000; also three 300-horsepower boilers at a cost of $11,000; steam piping to cost $4,000; stack to cost $4,000; two 5,000,000-gallon low lift pumps to cost $6,000 and miscellaneous machinery estimated at $10,000. A. J. Hammond is city engineer.

New Construction

Thomas Ward, Fayetteville, N. C., is erecting a foundry at that place.

The Fulton Machine & Vice Co., Lowville, N. Y., plans to build a one-story foundry addition in the spring.

The Diamond Brass Foundry & Machine Co., 219 North Curtis street, Chicago, is about to build a two-story factory.

Stewart & Clark, Chicago, are having plans drawn for a one-story forge shop addition, 125 x 153 feet. L. G. Hallberg, 154 West Randolph street, Chicago, is the architect.

W. J. Miles Jr., Middletown, O., is reported to be forming a $200,000 company with Middletown and Cincinnati capital, for the establishment of a plant in Nashville, Tenn., to produce malleable iron and steel castings.

The Cleveland Metal Products Co., Ivanhoe road, Collinwood, Cleveland, which recently increased its capital stock from $200,000 to $1,000,000, contemplates an extension to its plant. F. W. Ramsey is president of the concern.

The Illinois Oil Gas Heating Co., White Hall, Ill., whose incorporation was recently noted, advises that it may build a small foundry but not at present. It expects to place burners and oil in all the communities of Illinois and perhaps some other states.

That the Eureka Stove Co., Birmingham, Ala., will shortly start reconstruction of its buildings damaged by fire is generally understood in Birmingham. It is expected that $50,000 will be expended on the new foundry, erecting shop, show room, etc.

A factory building has been leased and equipment will be purchased by the Birmingham Metal Products Co., Birmingham, Ala., which has $35,000 capital stock. It will manufacture an electrically welded corrugated iron culvert. J. H. Dean, H. O. Barnard and others are interested.

The Winton Gas Engine & Mfg. Co., recently incorporated by Alexander Winton, president of the Winton Motor Car Co., Cleveland, and others, has let a contract for the construction of a one-story, brick and steel factory building, 80 x 300 feet. The new plant will be located on West 106th street, Cleveland.

The Moore Engineering Co., fourth floor of the New England building, Cleveland, is taking bids for a new plant to be erected for the Ohio Blower Co., Cleveland. The plant will be located in East Cleveland and will consist of a main building, 70 x 70 feet, and an ell, 60 x 140 feet, both stories. Building will commence early in spring.

Power Plant Equipment

The Kansas Gas & Electric Co., Independence, Kas., has purchased a site for a new power station.

Henry Rhynsburger, Pella, Ia., is considering the erection of an electric light plant at Leighton, Ia.

Wellsville, O., is considering the installation of a municipal electric lighting plant.

Barberton, O., contemplates the installation of a municipal electric lighting and power plant.

Springfield, O., is considering the installation of a municipal electric lighting plant.

The city of Batesville, Ark., will install a 200-kilowatt, three-phase, 2,200-volt, belted generator some time this spring.

Plans are being prepared for the installation of a power plant at St. Vincent's home, Sevententh street and Woodland avenue, Philadelphia.

The Meriden Electric Light Co., Meriden, Conn., is considering the construction of an addition to its power plant.

The authorities at Bryan, O., con-

template extensive improvements to the municipal electric lighting and water systems. The estimated cost is $46,000.

Akron, O., is considering the installation of a municipal electric lighting and power plant. John Payne is city engineer.

The borough trustees of Lynn, Ind., are in the market for the equipment for the proposed new municipal electric lighting and power plant.

The Middletown Electric Light Co., Middletown, Conn., has decided to install new turbines, condenser, boiler, etc., in its power plant.

Baker, Ore., has sold $45,000 worth of bonds for the erection of a municipal electric lighting plant and actual work will soon be commenced.

The City Electric Co., Shreve building, San Francisco, Cal., has taken out a permit for the erection of an electric sub-station on Folsom street.

McCaid & Armstrong, Hopkinsville, Ky., are building a cut stone plant, and will be in the market for equipment, including power machinery, air compressors, etc.

It is reported that J. J. Beemer contemplates the installation of an electric light plant to supply electricity for commercial and street lighting purposes at Pawpaw, Ill.

The Kentucky Traction & Terminal Co., Lexington, Ky., will build a power house at Frankfort, Ky. It will be a substation of the main plant at Lexington, which is now being erected.

The Pacific Gas & Electric Co., Sacramento, Cal., will soon commence the erection of a new power plant there. Modern equipment will be installed. Estimated cost $500,000.

The Louisville Veneer Mills, Louisville, Ky., will need electric motors, as it is planning to substitute electricity for steam in the operation of its plant. Address D. E. Kline.

A second dam will probably be constructed at Traverse City, Mich., across the Boardman river by the Boardman River Electric Light & Power Co. The cost will be about $25,000.

The city of Lawrenceburg, Ind., has taken over the plant of the Lawrenceburg Electric Light Co. and will make extensive improvements in the near future.

It is planned to make improvements this spring in the power plant of the Athens State hospital, Athens, O. Peter Archer is chief engineer of the institution.

The Erie County Electric Railway Co., Erie, Pa., is preparing plans for the construction of a power plant in that city. T. J. O'Dea is general manager.

The Elnora Electric Co., Elnora, Ind., will receive bids shortly for the equipment for an electric lighting and power plant. Thomas Nugent is president of the company.

Bids are being invited for the construction of an electric lighting plant at Osceola, Ark. The estimated cost is $30,000. W. N. Gladson, Fayetteville, Ark., is engineer.

The Sumter Electric Light Co., Sumter, S. C., is preparing to install a new 750-horsepower turbine and make other improvements which will entail the expenditure of about $25,000.

The Scranton Electric Co., Scranton, Pa., is planning to make extensive improvements and enlargements in its power generating capacity. It is estimated that the cost will be about $250,000.

The Cleveland, Southwestern & Columbus Traction Co., 615 Garfield building, Cleveland, contemplates the installation of new equipment at its power plant near Elyria, O. The estimated cost is $100,000.

George E. Shaad, engineer, Lawrence, Kas., has prepared plans for the construction of an electric light plant at Perry, Kas., and the contract for the machinery will probably be let in March.

The A. & T. Power Co., Sparta, Tenn., is interested in the erection of a hydro-electric plant and will transmit electricity from Sparta to Cookeville, Tenn. J. R. Tubb is president of the company, which will need equipment.

New machinery will be purchased later on by the Kentucky Public Service Co., organized recently in Louisville with $380,000 capital stock to operate lighting properties in Frankfort, Owensboro, Bowling Green and Hopkinsville, Ky. The new company will make arrangements to finance the improvements in the near future.

Government News

Bids were opened by the bureau of supplies and accounts, navy department, Washington, Jan. 30, for furnishing materials and supplies to be delivered at various naval stations, in accordance with the schedules and classes enumerated, as follows:

Schedule 4248, class 32, one acetylene generating and compressing equipment, to be delivered at Philadelphia, Pa.; Davis-Bournonville Co., New York, $5,900; Linde Air Products Co., Buffalo, N. Y., $1,937.50.

Schedule 4249, class 41, one 4,300-kilowatt generating set, to be delivered at Brooklyn, N. Y.: General Electric Co., Schenectady, $13,000; Karr Turbine Co., Wellsville, N. Y., $12,000.

Schedule 4255, class 81, 12 pneumatic hammers, to be delivered at Washington, D. C.: Chicago Pneumatic Tool Co., New York, $255; Consolidated Sales Co., Washington, $216; Cleveland Pneumatic Tool Co., Cleveland, $360; Dayton Pneumatic Tool Co., Dayton, O., $228; Independent Pneumatic Tool Co., Chicago, $336; Ingersoll-Rand Co., New York, $240; George Oldham Son & Co., Philadelphia, $300; Pittsburgh Pneumatic Co., Canton, O., $276.

Proposals will be received by the isthmian canal commission, in accordance with circular 679, to be opened March 1, for furnishing materials and supplies, to be delivered at the isthmus, as follows:

Class 1, 506 starting panels.

Class 2, 634 limit switches, commutating switches, overload cut-out switches, indicator switches, and hand-rail control switches.

Class 3, 472 miscellaneous remote indicators.

Class 4, five control switchboards.

Class 5, 240 fender-chain control apparatus.

The bureau of supplies and accounts, navy department, Washington, will receive proposals, to be opened on Feb. 27, for furnishing materials and supplies, for delivery at the stations named, in accordance with the schedules enumerated, as follows:

Press, hydrostatic wheel, one Charleston, S. C., 4331.

Machine, drilling, vertical, one, Charleston, S. C., 4331.

Machine, milling, vertical, one, Charleston, S. C., 4331.

Meters, watt-hour, 12, Charleston, S. C., 4333.

Proposals were received by the bureau of supplies and accounts, navy department, Washington, Jan. 23, for furnishing materials and supplies, for delivery at naval stations designated, in accordance with schedules enumerated, as follows:

Schedule 4197, class 31, Mare Island, for U. S. S. Jupiter, 1 refrigerating plant and spare parts: Cyclops Iron Works, San Francisco, $3,075; Peter Van Schaack & Sons, Chicago, $2,615.14; Vilter Mfg. Co., Milwaukee, $2,143.24; Wisconsin Ice Machine Co., Chicago, $2,203.50.

Schedule 4224, class 111, Boston, one cutting-off machine, 4½ inch: Fairbanks Co., Washington, $367; Manning, Maxwell & Moore, New York, $342.50 and $450; Niles-Bement-Pond Co., New York, $690.

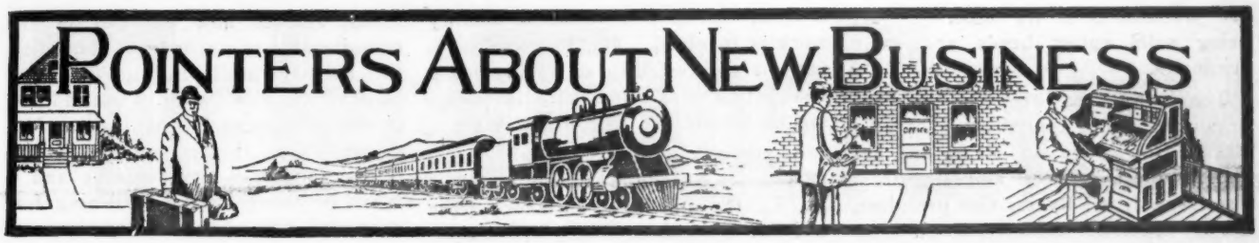
Class 112, do., one stationary head drill, 21 inches, power feed, wheel, and lever feed, back geared and fitted with automatic stop: Taylor Machinery Co., Boston, $100; Chandler & Farquhar Co., Boston, $100; Fairbanks Co., Washington, $97; Frevert Machinery Co., New York, $104 and $114; Garvin Machine Co., New York, $142; Kemp Machinery Co., Baltimore, $108.50; Manning, Maxwell & Moore, New York, $111 and $141.50; Niles-Bement-Pond Co., New York, $98; Prentiss Tool & Supply Co., New York, $148.

Class 113, one flat turret lathe, 2¼ x 24 inches: Jones & Lamson Machine Co., Springfield, Vt., $1,439; Warner & Swasey Co., Cleveland, O., $1,625.

Class 114, do., one No. 3 plain, high-power milling machine: Brown & Sharpe Mfg. Co., Providence, $1,857.55; Fairbanks Co., Washington, $1,917; Manning, Maxwell & Moore, New York, $2,349; Prentiss Tool & Supply Co., New York, $2,311.34, $2,270.73 and $2,304.59.

Schedule 4225, class 117, Brooklyn, power-driven sewing machines: three No. 7-29, one No. 11-18, one No. 11-8, one No. 11-24, one No. 31-15, one No. 42-5, needles, etc.: Singer Sewing Machine Co., New York, $1,524.95.

Schedule 4226, class 121, Norfolk, one surface condenser of 250 square feet cooling surface, with pump; Alberger Condenser Co., New York, $1,047; American Engineering Co., Philadelphia, $965; Blake & Knowles Steam Pump Works, New York, $1,215; Dean Bros. Steam Pump Works, Indianapolis, $725; M. T. Davidson Co., New York, $920; Union Steam Pump Works, Battle Creek, Mich., $927.75; Wheeler Condenser & Engineering Co., Carteret, N. J., $970.



New Buyers

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

The following manufacturing companies have filed articles of incorporation:

Utica Brass & Machine Co., Fort Worth, Texas; $5,000; by J. M. Bird, F. L. Lightfoot and R. L. Coy.

Little Giant Stove & Novelty Co., Fort Worth, Tex.; $40,000; by Lewis Alverson, J. H. Greer and G. H. Colvin.

Harrisburg Machine & Shipyard Co., Harrisburg, Tex.; $10,000; by J. W. Leary, C. A. Schooley and L. Johnson.

The Blast Furnace Appliance Co., Cleveland; $10,000; by J. C. Cromwell, Arthur G. McKee, F. M. Reddy, H. P. Mooney and T. C. Jennings.

The Byesville Motor Co., Byesville, O.; $10,000; gas engines and machinery; by Robert S. Hall, C. R. Austin, J. A. Pryer, E. M. Sperer and J. Glaser.

Rocky Mount Machine Works, Rocky Mount, N. C.; $50,000; by L. F. Pearsall, S. F. Jenkins, T. P. Jenkins and T. E. Jenkins.

Germania Refrigerating & Machinery Co., San Antonio, Tex.; $75,000; by W. G. E. Rolaff, Richard Wolfsky and Yale Hicks.

Union Boiler Works Co., Toledo, O.; $100,000; by J. Mason Youngs, Edwin Radbone, I. Allen Coby, U. S. G. Deaton and W. Finlay Radbone.

The Pioneer Iron & Steel Co., Sand Springs, Okla.; $75,000; by Benjamin F. Rice and C. B. Fahrquharson, of Tulsa.

The Specialty Brass Co., Kenosha, Wis.; $25,000; by Henry Anderson, Charles Anderson and L. C. Thomson.

The Kinnell Mfg. Co., Ltd., Morrisburg, Ontario; $50,000; to manufacture horseshoes, etc.; by provisional directors, Arthur Flynn, Wm. W. Flynn and Winnifred Allison.

Tabe-Sellew Motors, Ltd., Toronto, Canada; $1,000,000; to manufacture motors, etc.; by provisional directors, John B. Holden, George A. Grover, D. W. O'Sullivan and others.

The Pneumatic Cupola Co., Ironton; O.; $50,000; to manufacture an invention for the purification of cast iron by a pneumatic process; by L. P. Hoult, George Bary, W. J. Mahoney, F. J. Horschel and J. B. Corns.

American Poured Concrete Steel Molds Corporation, Washington, D. C.; $50,000; by John P. Jackson, 804 Nineteenth street, N. W., and Robert J. Harlan, both of Washington, and Harry A. Hood, of New York.

The Ohio Seamless Tube Co., Shelby, O.; $1,500; to manufacture tubing and other articles made of steel; by A. C. Morse, G. M. Skiles, W. W. Van Horn, E. W. Wiggins and R. P. Bricker.

The Safe Auto Co., Martinsburg, W. Va.; $125,000; to manufacture automobiles and supplies; by J. W. Scott, G. W. Buxton, E. S. Bottomly, W. C. Kilmer and S. W. Walker, all of Martinsburg.

The Shartle Continuous Beater Co., Middletown, O.; $50,000; to manufacture paper mill machinery; by Charles W. Shartle, Lucy C. Shartle, H. D. Martindale, G. Kaffenberger and W. T. Harrison.

West Rotary Engine Co., Monticello, N. Y.; $500,000; to manufacture machinery; by Augustus A. West, 494 Marion street, Brooklyn; Baird L. Short, West Collingwood, N. J., and Morris Meyers, 558 West 140th street, New York City.

Neenan Elevator Co., Manhattan, New York City; $2,000,000; to manufacture elevators and hoisting apparatus; by Wm. Rice, 3039 Broadway, New York City; Herbert H. Knight, Fanwood, N. J.; and Henry C. Workman, Briarcliff Manor, N. Y.

Niagara Metal Weather Strip Co., Niagara Falls, N. Y.; $20,000; to manufacture metal weather strip; by Frederick S. Franklin and Carolyn H. Franklin, both of Hamburg, N. Y., and Freeman H. Palmer, 45 Manchester place, Buffalo, N. Y.

Rumely Products Co., Mineola, Nassau county, N. Y.; $50,000; to manufacture machinery, agricultural implements, etc.; by Leo M. and Aloysius J. Rumely, both of Laporte, Ind.; and Alonzo Potter, 25 Broad street, New York City.

F. W. Bussmeyer Gas Producer & Machinery Co., St. Louis; $10,000; to manufacture gas, electric and steam appliances, machinery, etc.; by Frederick W. Bussmeyer, Magdalena Bussmeyer, William J. Bussmeyer and G. H. Wilson.

The Augustine Rotary Power Co., Columbus, O.; $500,000; to manufacture steam and internal-combustion engines, power and transmission machinery and supplies; by Benjamin F. Augustine, John I. Moore, J. I. McCullough, A. E. Cather and D. B. Grubb.

Apperson Motor Car Co. of New York, Manhattan, New York City; $10,000; to manufacture machinery, motor engines, motor vehicles, etc.; by Henry H. and Marie Cannon, 54 West Fifty-fourth street, New York City; Mary E. Grasmuck, Tenafly, N. J., and Frederick A. and Marion C. Grasmuck, 34 Convent avenue, New York City.

General Industrial

The Cincinnati Gear Co., Cincinnati, has increased its capital stock from $11,000 to $33,000. No extensions will be made and no new equipment will be needed at the present time. The officers of the company are: President, Philip Fosdick; vice president, John Christensen; secretary, John H. Clermont, and treasurer, Soren J. Sorensen.

The United States Ratchet Wrench Co., 215-17 N. Adams street, Peoria, Ill., which was recently incorporated for $20,000, advises that it expects to have its product manufactured in Peoria and handled through a warehouse for the present. The officers of the company are: President, Milton White; vice president, Louis Rediger; treasurer, George Rediger.

The Toledo Steel Spring Co., 431 Spitzer building, whose incorporation was recently noted, advises that it will make lock-nuts of the spring type. No building will be done as the company proposes to rent a plant. All equipment has been arranged for. In the temporary organization of the company C. S. Davis is president and John M. Ormond is secretary.

The Stamm Machine Works, Aurora, Ind., whose incorporation was noted recently, means the re-organization of a business established in the 80s. It expects to carry on the same business as did the old firm, manufacturing edge tools and machinery

for woodworkers, its main product being solid cutter heads and stave rejointers.

The Iron River Steel Co. has been organized with a capital stock of $30,000, in Iron Mountain, Mich., and has chosen these officers and directors: President, I. W. Byers; vice president, W. H. Sheldon; secretary, F. A. Morrison; general manager, W. H. Jobe; directors: These officers and Dr. E. M. Libby, N. E. Fisher, E. V. Van Ornum and Joseph Konwinski.

The C. C. Knight Co., Sixteenth and Callowhill streets, Philadelphia, iron and steel jobber, has been reorganized by the election of Henry C. Potter Jr. as president, Francis C. Adler as secretary and treasurer, while Chas. P. McDermott has been made the head of the purchasing and sales department. The former officers were: S. S. McCormick, president, and E. L. Parry, secretary and treasurer.

At a recent annual meeting of the stockholders of the Stockton Iron Works, Stockton, Cal., the following were elected: President and general manager, W. E. Treadway; vice president, John Grant; treasurer, E. T. Haas; J. H. Thompson and Mrs. L. H. Tretheway. The directors elected A. H. Wright secretary of the board and declared the annual dividend of 6 per cent.

The Frost Engine Co., recently incorporated at Evansville, Wis., with an authorized capital of $20,000, proposes to engage in the manufacture and sale of gas and gasoline engines, feed grinders, tanks, windmills and implements. The company is headed by F. S. Frost, with whom are associated W. H. H. Johnson, W. B. Meggott, George L. Pullen, A. E. Durner, T. C. Richardson and C. J. Pearsall. Definite plans are now under way.

The Buffalo Sheet Metal Works, Buffalo, N. Y., advising respecting a recently noted fire, says that it started on the third floor in the shop of the Niagara Metalware Co. The building is a five-story brick structure occupied by the Buffalo Sheet Metal Works, Root Neal & Co., Farnum Mfg. Co., Mey Chain Belting Co. and Niagara Metalware Co. Most of the damage was caused by water. All these firms have about finished the repairs necessary and are again operating.

The proposed works of the Enterprise Foundry Co., at Richmond, Cal., are being steadily erected, the company desiring to begin operating as soon as possible. This haste is due to the Enterprise company being interested in some large contracts which have been taken by the Western Pipe & Steel Co., in which certain foundry work is involved. The Western company is now working on tubing for a contracting firm to be used in pumping mud from the Key Route basin.

At the annual meeting of the Salisbury Steel & Iron Co., held at Utica, N. Y., the following directors were elected: Edward L. Wells, William H. Switzer, Utica; A. M. Mills, Little Falls; William J. Myers, H. W. Hoops, New York; Henry N. Clark, Boston, and George C. Wing, Auburn. The directors will meet at an early date in New York to elect officers and to consider future operations of the iron properties located at Salisbury, Herkimer county, N. Y.

The Simplex Mfg. Co., Anderson, Ind., which was recently organized with a capital stock of $50,000, to manufacture the Stanley self-starting attachment for automobiles, has chosen these officers: President, W. R. Poland; vice president, J. F. Stanley, inventor of the Stanley engine; treasurer, Guy E. Derthick; secretary, Will S. Poling. The starting device, which is operated by gasoline, will be manufactured at the Stanley engine plant at Brown street and the Central Indiana railroad.

Stockholders of the Beatrice Iron Works, Beatrice, Neb., have decided to amend the articles of incorporation and increase the capital stock from $50,000 to $150,000. Some of the increased capital will be used to purchase new and additional machinery and make further improvements. The company has elected these officers: President, Henry Scheve; vice president and general manager, R. R. Kyd; secretary-treasurer, August Schaefer. These officers together with E. J. Shinn and H. A. Thompson constitute the board of directors.

The Kerosene Gas Producer Co., incorporation of which was recently noted, advises that it operates a plant at 227 Borden avenue, Long Island City, N. Y., at which location it manufactures oil converters. This converter is designed for use as an integral part in engines and is sold directly to manufacturers of engines. The device has already been adopted by the Loew Victor Co., Cleveland. The company's plant contains 27,000 square feet of floor space which is completely equipped with modern machinery and it is expected that 100 converters will be turned out daily in about three months.

The Fidelity Machine & Mfg. Co., Frankfort, Philadelphia, recently incorporated, has purchased the entire plant and machine tools of the Cocker Machinery Co., which had recently failed, and is now engaged in the manufacture of cylinders and dials for knitting machines and is doing general machine work. In addition to the equipment of the Cocker Machinery Co., the company has installed American gas furnaces and a No. 3 Browne & Sharpe hardening furnace and also special automatic machinery for making cylinders and dials. The plant consists of a two-story brick building, 60 x 84 feet, with 10,000 square feet of floor space. A 40-horsepower steam engine and boiler has been installed. John J. Higgenbottom, who has long been connected with textile machinery manufacturers of Philadelphia, is president and has charge of the plant.

Trade Notes

George M. Newhall Engineering Co., Philadelphia, announces that after Feb. 1, its general offices will be located at 807-8-9 Morris building, 1421 Chestnut street.

The partnership heretofore existing under the name of MacGovern, Archer & Co. has been dissolved and Mr. MacGovern has incorporated MacGovern & Co., Inc., with offices at 114 Liberty street, New York City. It will continue the business of handling machinery.

The Chain Belt Co., Milwaukee, manufacturer of conveying and elevating machinery, etc., has opened an office in the Old Colony building, Chicago, in charge of Benjamin S. Reynolds, a member of the company's engineering staff.

The Pittsburgh Shafting Co., of Detroit, has just added two additional lines to its warehouse stock. These are 3½ per cent cold drawn nickel steel, from ⅜ to 1⅞ inches in round, and ½ to 1½ inches in hexagon sections, and 20 to 30 carbon case hardening steel, from 9/16 to 4 inches in round and 9/16 to 1⅛ inches in hexagon sections.

Fires

The plant of the Anderson Tool Co., Anderson, Ind., was badly damaged by fire on Jan. 26, the loss being about $50,000.

The plant of the Waterloo Drop Forge Co., Waterloo, Ia., was badly damaged by a fire, Jan. 30, that caused an approximate loss of $75,000.

The Detroit Forging Co., Detroit, suffered a $35,000 loss by fire Jan. 25. Insurance is adequate and the burned portions of the plant will be restored without delay.

The plant of the Galena Iron Works, Platteville, Wis., was damaged to the extent of $1,000 by fire supposed to have originated from sparks from a passing locomotive. The loss was fully covered and the damage has already been repaired.